Guidelines for Integrating Helicopter Assets into Emergency Planning

DOT/FAA/RD-90/11

Research and Development Service
Washington, D.C. 20591

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U.S. Department
of Transportation
Federal Aviation Administration

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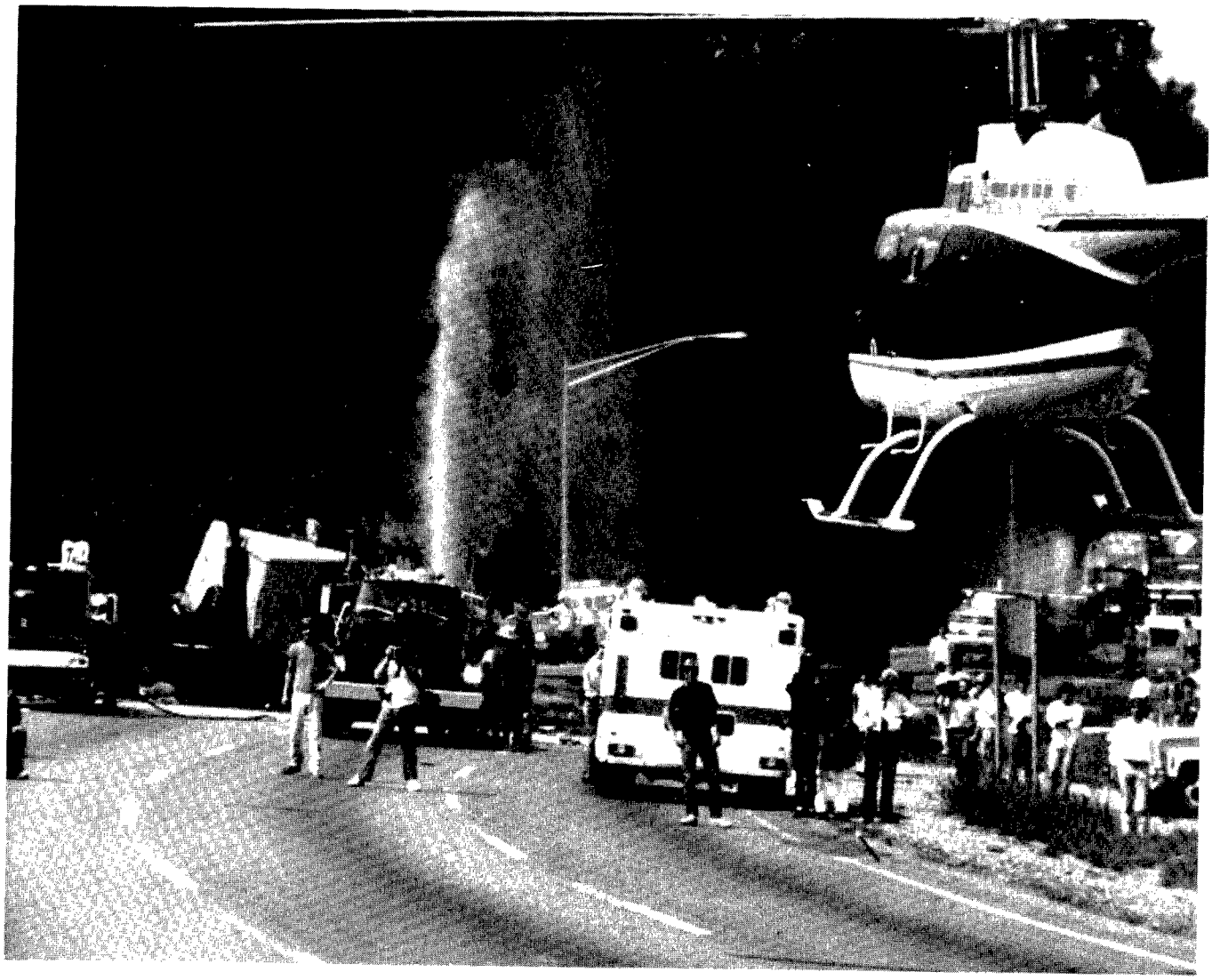

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U.S. Department
of Transportation

**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

Dear Colleague,

In the last four decades, helicopters have proven their value to communities when disaster strikes. And yet, all too often people simply assume helicopters will appear at an emergency. The truth is that, without careful emergency planning, rotorcraft may not appear or if they do, might not be used to their full potential and the maximum community benefit. Consequently, emergency planners often do not take the best advantage of helicopter assets within their planning area. Often there are public service, private, and military helicopters that may be available to help deal with a crisis situation. Helicopters and their complementary heliports are indeed community assets that require advance planning for their most effective use.

Enclosed you will find a copy of the final report, "Guidelines for Integrating Helicopter Assets into Emergency Planning." These guidelines are based on accepted disaster planning concepts, tempered with "lessons learned" through the analysis of 18 case histories ("Rotorcraft Use in Disaster Relief and Mass Casualty Incidents - Case Studies," DOT/FAA/RD-90/10, June 1990). The guidelines contain recommendations on how to best integrate helicopters into existing emergency planning in order to provide maximum protection and life saving services in the community. Further information is provided on developing an inventory of helicopter resources; surveying helicopter operators capabilities; determining communication capabilities and requirements; designating, establishing, and controlling landing zones; and implementing a planned helicopter response.

You are free to make copies of the guidelines or you can request additional copies from:

Federal Aviation Administration
Vertical Flight Program Office, ARD-30
ATTN: Robert D. Smith
800 Independence Avenue, S.W.
Washington, D.C. 20591

The earlier case studies report may also be requested from the above office while supplies last. Alternatively, it can be ordered from: National Technical Information Service (NTIS), Springfield, VA 22161, phone (703) 487-4650, government accession number AD-A229401.

In addition, two video tapes were produced which address the integration of helicopters in emergency planning:

Guidelines for Integrating Helicopters into Emergency Planning; General Audience version, run time 13:00, cost = $10.00.

The Guidelines video explores the basic elements of planning for helicopter usage. It provides an introduction to the variety of missions that helicopters can perform as well and highlights plan preparation, resource inventory, communications, landing areas, and plan implementation. The video has a catchy comic strip opening and all audiences should enjoy and benefit from viewing this video.

Success by Design...Integrating Helicopters into Emergency Planning; Instructional view of guidelines, run time 21:04, cost = $10.00.

Emergency planners, emergency rescue workers, and helicopter operators will learn the approach to integrating helicopters into emergency planning. The tape introduces each of the planning elements: plan preparation, resource inventory, communications, landing areas, and plan implementation. This video covers each of the planning elements in greater detail than the general audience show. It introduces the audience to the various missions helicopters can perform, discusses common misconceptions about their capabilities, and provides examples of where they have been used successfully.

Video tapes are $10.00 each which includes postage and handling. You are free to make copies of the video tapes as well, but higher video quality can be maintained by reordering original tapes. For requests from outside the North American continent, other video formats (such as PAL/SECAM) are available on request at a higher cost.) Videos can be obtained by sending a check, money order, or government purchase order and by specifying the exact title of the video as it is shown above to:

Media Associates, Inc.
Attn: V.G. Jordan
P.O. Box 5747
Springfield, VA 22150-5747

Phone 1-800-628-3556
or 1-703-866-6100

After you have reviewed the guidelines, please take the time to complete the enclosed response form. We would like to know whether the guidelines are useful to you and your community.

We hope that these guidelines assist you and your community in determining your available helicopter resources and how to best integrate these special aircraft into your emergency plans.

RESPONSE FORM

Guidelines for Integrating Helicopter Assets into Emergency Planning, DOT/FAA/RD-90/11, July 1991. We are interested in your opinions. Please take a moment to answer the following questions:

What are your comments on the guidelines:

What are your comments on the associated videotapes:

Have you already considered helicopters in your disaster planning?

What use do you expect to make of this report and the associated videotapes?

What should the Federal Aviation Administration consider in terms of future work on issues related to rotorcraft use in disaster relief? Please feel free to comment widely as we will use your comments to identify requirements for further studies.

You may also use this response form to request additional copies of the written reports:

____ Rotorcraft Use in Disaster Relief and Mass Casualty Incidents - Case Studies, DOT/FAA/RD-90/10, June 1990.

____ Guidelines for Integrating Helicopter Assets into Emergency Planning, DOT/FAA/RD-90/11, July 1991.

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16. Abstract

In the last four decades, helicopters have proven their value to communities when disaster strikes. And yet, all too often people simply assume helicopters will appear at an emergency. The truth is, without careful emergency planning, rotorcraft may not appear or if they do, might not be used to their full potential and the communities' maximum benefit. Consequently, emergency planners often do not take the best advantage of helicopter assets within their planning area, in the form of public service, private, and military helicopters, that may be available to help them deal with a crisis situation. Helicopters and their complementary heliports are indeed community assets which require advance planning for their most effective use.

These guidelines are based on accepted disaster planning concepts, tempered with "lessons learned" through the analysis of 18 case histories ("Rotorcraft Use in Disaster Relief and Mass Casualty Incidents - Case Studies," DOT/FAA/RD-90/10, June 1990). The guidelines contain recommendations on how to best integrate helicopters into existing emergency planning in order to provide maximum protection and lifesaving services in the community. Further information is provided on developing an inventory of helicopter resources; surveying helicopter operators capabilities; determining communication capabilities and requirements; designating, establishing, and controlling landing zones; and implementing a planned helicopter response.

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DEDICATION

This document is dedicated to all the rotorcraft pilots who have been involved in disaster relief efforts over the years. It is also dedicated to two individuals who have led the way with their pioneering efforts to show how rotorcraft can and should be used to benefit the community at large:

Harry J. Gaynor
National Burn Victim Foundation
Orange, New Jersey

Paul R. Powers
Bell Helicopter Textron Inc.
Dallas/Fort Worth Helicopter
Emergency Lifesaver Plan (HELP)

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INTRODUCTION

On Friday, January 13th, 1982, Air Florida Flight 90, a Boeing 737-222 with 74 passengers and 5 crew members on board, crashed in a blinding snowstorm on takeoff from Washington National Airport. It first struck the 14th Street Bridge, congested with rush hour traffic, and then came down in the ice-covered Potomac River below. Only four passengers and one crew member survived the accident.

> At 11:00 A.M. on Friday, January 13, 1982, the National Weather Service (NWS) in Washington issued a special weather statement that continued an earlier winter storm warning and predicted that snow would continue into the afternoon and, at times, become mixed with sleet and freezing rain.
>
> At 2:00 P.M., because of the deteriorating weather conditions, the federal government agencies announced early dismissal of their employees, releasing some 400,000 commuters into the streets. Area schools also began dismissal early.
>
> At 3:00 P.M., the District of Columbia Department of Transportation was notified that an additional four inches of snow would fall. In the downtown area and on access roads, the traffic was slow and hazardous. A partial gridlock had developed downtown with traffic blocking some key intersections.
>
> At 3:59 P.M., Air Florida Flight 90, a Boeing 737 aircraft, carrying a total of 79 people, was cleared for takeoff by National Airport control tower. Taking off in a northwesterly direction over the Potomac, it immediately lost altitude, struck six vehicles on the inbound span of the 14th Street Bridge (about 20 feet from the Virginia shore), continued through the railing on the northwest side of the span, and crashed into the river, which was covered with five to eight inches of ice. The weather conditions were poor and deteriorating, temperature was in the low 20's and visibility was less than one-half mile."[1]
>
> At 4:11 P.M., the U.S. Park Police were notified of the accident and asked to send one of its medevac helicopters to the scene to assist in rescuing the survivors, some of whom were now reported to be in the water.[2]

U.S. Park Police pilot Don Usher, and paramedic Gene Windsor, responded to the call. A fellow police officer plowed the ramp with his personal 4-wheel drive vehicle and assisted the flight crew in pushing the helicopter out of the hanger. The policemen, on standby duty at U.S. Park Police Headquarters in Anacostia Park, Maryland, quickly grabbed life preservers and rope, boarded their Bell LongRanger, and took off. Usher flew "Eagle One" toward the 14th Street Bridge.

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[1] "Rotorcraft Use in Disaster Relief and Mass Casualty Incidents - Case Studies," Federal Aviation Administration, Washington, D.C., June 1990, p. 25-26.

[2] Ibid, p. 27.

> While en route, the crew of Eagle I, was given three separate locations for the accident site. However, they also headed for the bridge. By 4:13, airport officials informed Arlington dispatchers the plane was a 737 jet-liner and that at that time the number of passengers and crew on board was unknown.
>
> Eagle I, with pilot Usher and crewman/paramedic Windsor aboard, was now visible in the immediate area. Repeated attempts to reach any of the ground units by radio for instructions were unsuccessful. They were to learn much later that personnel on the ground had not switched to the correct frequency until 4:22 - two minutes too late to hear Eagle I. Early attempts with ropes and ladders to reach the survivors 50 - 100 feet offshore failed. Boats and divers were not yet on the scene.
>
> 'When you see an airline disaster you expect mayhem and slaughter,' said Usher, during a later interview, 'The biggest surprise was that there was only broken ice where, apparently, the main fuselage had gone through: the tail section above the water with six people hanging on it, and a lot of debris, insulation, luggage, handbags and clothes.' The helicopter crew didn't know it yet, but there would only be those six to rescue. The others were doomed the moment the water rushed into their ruptured (airliner) cabin.
>
> The six had to be rescued quickly, however, before the frigid water claimed them... One woman, 22-year old Priscilla Tirado, lost her grip and was about to drown when an onlooker, Lenny Skutnik, 28, plunged into the river and brought her close enough to the bank for fireman John Leck to swim out and retrieve her. Later, doctors would measure Tirado's body temperature at 81 Fahrenheit; she was only several minutes from death by cardiac arrest.
>
> The rescue ended on a wrenching note: one of the six people clinging to the tail, a middle-aged man who was still unidentified at the weekend, had repeatedly passed the lifeline to fellow passengers rather than save himself. When the helicopter went back for him at last, he had slipped beneath the surface. 'In a mass casualty you'll find people like him,' said Windsor, 'but I've never seen one man with so much commitment.'[3]

That even five people survived was due, at least in part, to the timely arrival of a U.S. Park Police helicopter that was able, despite a lack of proper on-board rescue equipment, to help extricate those survivors and get them safely to shore. The efforts of the helicopter's crew, witnessed live on national television, provided dramatic proof of its effectiveness as a disaster relief tool. Ironically, the Park Police helicopter was not there as a result of any coordinated disaster response plan, but rather by a fortunate combination of circumstances.

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[3] Ibid, pp. 28-29.

The Need For Guidelines

Often, it seems as if people think that helicopters just naturally "appear" at disaster situations. In fact, the public is generally unaware of the extensive planning that is necessary for helicopters to lend their unique form of assistance in the most effective manner. Not surprisingly, many of the public agencies charged with the specific responsibility of preparing and planning for disaster response share this lack of awareness. As illustrated in the Air Florida accident, and in other disasters in the last four decades, helicopters have proven beyond a doubt their value in disaster relief operations.

The concept of using medevac or emergency medical service (EMS) helicopters to reduce mortality rates has been well established since the Vietnam war. Thousands of traumatic injury victims, both military and civilian, that reached medical treatment facilities within the first "golden hour," owe their lives to the helicopters and crews that delivered them rapidly to specialized facilities. Many hospitals across the country have established EMS helicopter ambulance services and many others have a helipad conveniently located near their emergency room entrances. The EMS helicopter business has enjoyed spectacular growth over the last 20 years and continues to be one of the most dynamic areas of the helicopter industry today.

As widespread as EMS helicopters have become, they are still limited in their ability to respond to large disasters and mass casualty incident (MCI) situations. EMS helicopters usually are based at major medical centers in metropolitan areas. There are a limited number in each community whereas in some areas of the country there are a greater number of private and military helicopters available. Air medical service helicopters are configured primarily for flying critically injured patients from the scene to a trauma facility. Often in such disaster situations, additional help is needed to perform a variety of support functions that may not necessarily be best performed by an EMS helicopter. Private EMS helicopter operators and pilots operate under Federal Aviation Administration (FAA) Part 135 rules and regulations when other than the flight crew is on board and thus are prohibited from performing external hoists, lifts, or loading and unloading passengers without coming to a complete landing. Non-commercial helicopter operators may be able to provide additional help and they are usually ready, willing, and able to provide that help when needed.

Disaster planning for the community is the responsibility of many public and governmental agencies at various levels. The vast majority of those agencies are very proficient and effective in that effort, yet many of them are unaware of the helicopter assets that might be available in the local area. In isolated cases, communities have identified their helicopter resources.

For example, the Dallas/Fort Worth Metroplex, has successfully incorporated locally based helicopters into their disaster preparedness planning and regularly hold realistic exercises to test their effectiveness and to resolve problems under controlled conditions.

Current disaster planning for the utilization of all general aviation aircraft and resources, including helicopters is guided by FAA Advisory Circular (AC) 00-7B, "State and Regional Disaster Airlift (SARDA) Planning," August 1987. This advisory circular has been issued by the FAA to State and local Governments to encourage the use of general aviation to mitigate disasters. Consult your state aviation or division of aeronautics office for further information and for how your local planning would tie in at the State level.

These guidelines are an effort to acquaint disaster planning, civil defense, and emergency preparedness agencies with the helicopter's capabilities and to help them take advantage of the helicopter assets that might exist within their local area. They are based on generally accepted planning concepts and "lessons learned" through the study and analysis of many case histories of disasters and mass casualty situations where helicopters were used in various support capacities. Another report "Rotorcraft Use in Disaster Relief and Mass Casualty Incidents - Case Histories," FAA report number DOT/FAA/RD-90/10, details 18 varied incidents where helicopters where involved in disaster relief or mass casualty incidents.

Guideline Goals

Participants in emergency planning and response must understand the plan and their role in its implementation. It is only natural to be highly motivated to participate in direct lifesaving missions, but there are many other vital support functions which may require the use of helicopters in an emergency response. The guideline goals are described below.

To save lives. Specialists in the treatment of trauma victims are well aware of the significance of the first hour after the trauma injury, as the "golden hour," in the reduction of mortality rates. Helicopters provide an unparalleled means to transport severely injured patients over long distances, unaccessible areas, heavy traffic, or disrupted ground transportation to appropriate treatment facilities. An often overlooked capability is to transport medical personnel directly to the scene.

In mass casualty situations and natural disasters, the benefits of helicopter use are multiplied by the greater number of cases requiring rapid transport and the number of support functions that may be required to relieve the emergency. Emergency

response to remote sites which include high-rise rooftops in the middle of major metropolitan areas or through flooding, snow drifts, or even rush-hour traffic, may prove to be an agonizingly and dangerously slow process. Maximum accessibility to helicopter services in disaster situations may expedite lifesaving efforts in many cases.

To acquaint community leaders and planners with the disaster relief capabilities of helicopters. Most people are generally familiar with helicopters, but have very little actual knowledge about their operations and capabilities. This also includes the use of the general aviation fleet and its fixed-wing aircraft resources. In a professional sense, the same can be said of most emergency preparedness planners. It is absolutely essential to have a complete and realistic understanding of helicopter capabilities in order to effectively incorporate them into existing plans. In this way, planners can broaden their range of options for response to emergency situations and provide superior professional services to the community.

To provide planners with guidelines to effectively integrate the use of helicopters into local disaster preparedness and mass casualty incident planning. Most emergency planners do not possess a high level of expertise in helicopter operations nor can it be assumed that they have ready access to a separate source of information on the subject. For this reason, the guidelines have been developed. They are provided here to encourage planners to consider helicopters in their overall planning efforts in the use of general aviation resources and to ensure safe and effective use of helicopter capabilities when needed.

To open lines of communication between helicopter operators and the community. Most non-EMS civil helicopter pilots are willing to help out when needed, but they and their management are often frustrated by a lack of coordination and communication with local disaster planning agencies. This document is intended to facilitate such communications. In this manner, it will allow communities to benefit from increased cooperation between local civil helicopter operators and disaster planning agencies.

To encourage the establishment of heliports in the community. Helicopters can go many places where an airplane can not and they do not need an airport for a landing site. However, if they are to help in disaster situations they do need landing sites in close proximity to the disaster site. This is particularly true in urban environments. If such landing facilities are to be available when disasters occur, the community needs to plan and develop heliports in advance of the actual event. It is hoped that a general recognition of the obvious value of helicopters in disaster relief will lead to the realization that there are other benefits to having access to helicopter services in an urban

environment. This, in turn, will aid in the establishment of needed heliport facilities in both the urban and rural setting.

Assumptions

Before these guidelines can be applied in a given disaster preparedness planning effort, certain assumptions must be made regarding the nature of the situation in which helicopters can be used. Also, to avoid any confusion or misunderstanding about the true purpose of these guidelines, baseline conditions and ground rules are established to provide an appropriate foundation.

First, there must be a general plan for local disaster and mass casualty incident relief in effect or in development. References to planning documents can be found in both the American Society for Testing and Materials, Standard Guide for Planning and Response to a Multiple Casualty Incident, and the Federal Emergency Management Agency, Guide for the Development of State and Local Emergency Operations Plans. An incident command system (ICS) is probably in place which includes an organizational position for air operations. The provisions in these guidelines are intended to incorporate local helicopter assets into existing plans or concurrently as new plans are being devised, not to serve as a "stand alone" disaster preparedness document.

Obviously, an assumption must be made that there are indeed helicopters available within the planning jurisdiction for disaster relief operations. A comprehensive helicopter integration plan would not be worth much if there were no helicopters to use in a disaster situation or if the helicopters in the area were unwilling or unable to participate. Fortunately, this has proven to be a highly unlikely circumstance in most areas. As mentioned earlier, most helicopter pilots are very willing to get involved and lend assistance, but pre-planning and endorsement by corporate leadership is a critical requirement.

Another assumption is ground-based ambulances must be considered the primary, expected and desired means of transport in a disaster situation when roads are passable. In many instances, however, helicopters will be indispensable and provide the most efficient transport service. Helicopters may also support the incident commander with other support missions not capable or prudent to exclusive use of ground units. However, it will never be possible to guarantee that helicopters will be available. Quite often, the disaster situation and its attendant casualties are a direct or indirect result of extreme environmental conditions. Those same extreme conditions could preclude or severely constrain the use of aircraft in the initial phases of the response. To be sure, helicopter pilots will make every effort, within the limits of safety, to be there when needed, but

they should be considered auxiliary only and reliance should always be placed first on ground-based units.

Over 93 percent of the contiguous United States and 46 percent of Alaska are covered by public or private EMS helicopter ambulance services, "Air Ambulance Helicopter Operational Analysis," DOT/FAA/RD-91/7, (see figure 1). Almost all of the aircraft used by these services are specially configured with advanced life support equipment and have crews who are highly trained in its use. These air medical services may already be part of the local area emergency response system. Therefore, the assumption is made that the required airlift of trauma victims will first be accomplished with medically configured helicopters. When the hospital-based EMS resources or city/county/state helicopter resources are overwhelmed either from patient transport or other support requirements as the incident commander has determined, it is time to implement the plan for "other" helicopter participation.

Finally, it must be assumed that certain planning aspects are outside the scope of these guidelines. These include charges for patient and passenger transport, protocols for determining a patient's destination hospital (other than those based on lifesaving reasons), and reimbursement for helicopter operational costs. While these are important considerations that need to be addressed, particularly to assure the economic viability of the helicopter support system, they are best dealt with as normal business arrangements between the interested parties. If support is requested by the Federal Government or under a State SARDA plan, the cost of the missions is normally reimbursable.

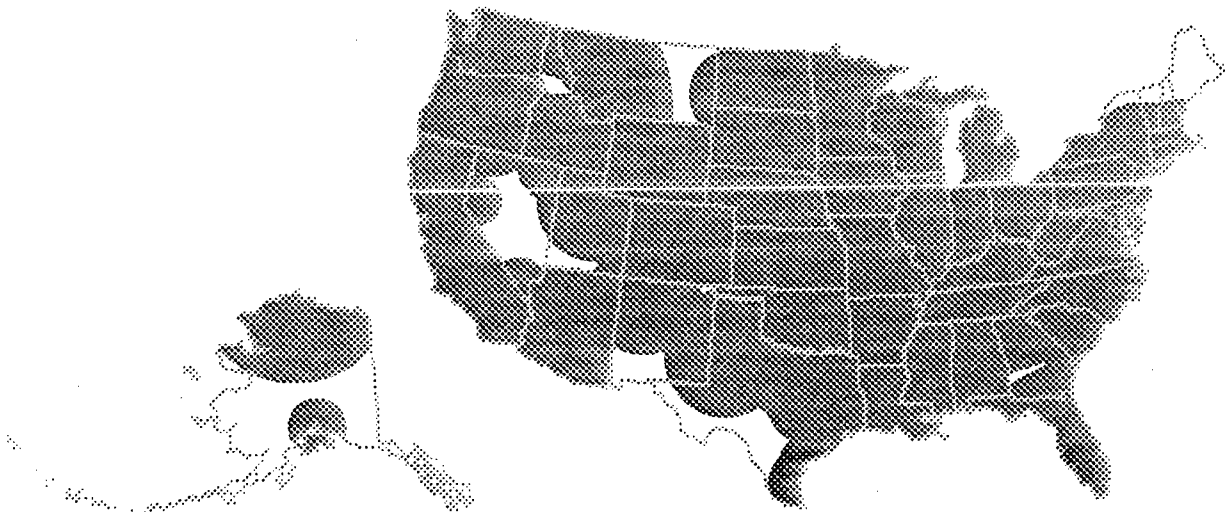

FIGURE 1 1990 EMS COVERAGE

It is also recognized that it is very important to have all persons who might be involved in emergency relief work be registered by their local emergency preparedness agencies prior to a disaster. The workers may then be covered under workmen's compensation laws and be covered under liability coverage as well. In addition, some sort of badged identification could be provided to indicate the worker is already registered.

Operational Priorities

Helicopters are extremely versatile aircraft and can be used to great advantage in many applications. They have so many uses, in fact, that priorities must be established as part of any helicopter integration plan in order to assure that the most important jobs get done. As helicopter availability increases in a given situation, they need to be assigned the most critical missions first according to the needs of the incident commander. Also, as more aircraft get involved in the relief effort, rights-of-way must be established so the various aircraft do not interfere with each other in their respective jobs.

It goes without saying that the number one priority in any aviation activity is safety. An all-encompassing, pervasive concern for safety in all helicopter applications will maximize the benefits derived from their use.

Generally, the highest priority missions are in direct support of lifesaving efforts. Other missions may not be life critical, but they are important support functions which may be requested by the incident commander.

Regardless of the mission type, however, it is imperative that missions be carried out so as not to impair the efficiency of workers on the ground or to further endanger the survivors.

Potential Helicopter Missions in Support of The Disaster/MCI Relief Effort

There are a variety of missions that can be performed by helicopters. Each community needs to assess the ways helicopters can be used to support their unique relief requirements. All helicopter operators should be familiar with the FAA Federal Air Regulations (FAR) contained in Title 14 of the Code of Federal Regulations (CFR) that affect their operations under each of these potential mission types.

Search and rescue (SAR) missions. Normally, these missions would be handled by Civil Air Patrol(CAP), United States Coast Guard(USCG), or public service (State Police) units that regularly practice these types of operations with their own aircraft and crews, and are most likely already integrated into the existing disaster response plan. Additional helicopters from

the local community should only be used for SAR work in cases of extreme urgency and their efforts coordinated by the responsible SAR agency. The "National Search and Rescue Manual," Volume I: National Search and Rescue System, AFM64-2, paragraphs 200-227 detail the domestic agencies involved in SAR missions.

Transport of medical teams/supplies to the disaster site. Helicopters can perform the transportation of medical teams and supplies from designated hospitals and/or trauma centers to the disaster site for triage and initial treatment of trauma victims.

Transport of medical teams/supplies to the affected hospitals. The transportation of medical teams and supplies from pre-designated hospitals, collection points, or supply centers to the primary receiving hospital(s) (usually closest to the disaster site or region) that may become overwhelmed with disaster victims. Medical personnel privileges generally do not transfer from one hospital to another. The emergency services coordinator in each state should know what the policies are between hospitals. This is another area where prearranged permissions need to be addressed.

Transport of trauma patients. The primary responsibility of EMS helicopters would be the transport of trauma patients. Many emergency plans suggest that the nearest hospitals to the incident be leapfrogged when helicopters are available. This reduces the chance of the closest hospitals becoming overwhelmed with critical care patients. Helicopters can also perform hospital-to-hospital transfers to place patients in the most appropriate specialty treatment center.

Transport of disaster specialists. Helicopters are particularly useful in the transportation of disaster specialists to the disaster site or operations center where they can contribute most effectively to the relief effort. They can be transported from predesignated assembly points for pickup when ground transportation has failed. These could include public safety employees: police, fire, and city emergency workers.

Emergency evacuation. In normal, as well as disaster situations, helicopters are used as an alternative to surface-based transport modes. In a high-rise building fire, they can be used to retrieve fire victims trapped on the roof or on balconies when elevators and stairways are rendered unserviceable by fire and smoke. Similarly, fire fighters denied the same access to elevators and stairways can be lifted to the roof for fire fighting and rescue operations. Helicopters are used to pickup people stranded on car tops, rooftops, or in trees by swiftly rushing flood waters that no boat could negotiate. In many cases, the helicopter may be the only means of reaching and transporting both rescue workers and victims.

Airborne control and assessment. It may be necessary to use a helicopter as a mobile aerial platform from which a deputy incident commander can observe and report on the disaster response efforts.

Airborne air traffic control (AATC). When the number of aircraft involved in the disaster relief effort exceeds four or five, it may be advisable to assign one of the helicopters the mission of airborne air traffic controller. Depending on the nature of the operations and the proximity of aircraft to each other, an airborne aerial controller can significantly improve safety. In the Dallas/Ft.Worth area, the Helicopter Emergency Lifesaver Plan (HELP) designates the police helicopter as their aerial controller. Naturally, the landing zone controller will communicate with the aircraft also to assist with safe landing and takeoff operations. See additional information in chapter 4 - Communications and chapter 5 - Landing Areas.

Electronic news gathering (ENG). At the very least, there are two types of information derived from the use of ENG: 1) real time aerial photographs of the disaster scene that can be transmitted to the ground and 2) dissemination of general public information to maintain a sense of confidence and morale regarding the relief effort. First, real time footage of the disaster scene that is transmitted to the ground can be viewed by the disaster coordinators for assessment of damage and possible deployment activities. Aerial photos can be "freeze framed" and distributed with annotations on where the relief activity should be focused and at what levels. Second, "maintenance of morale" is a recognized requirement in coping with disasters. Victims and survivors need to know what is being done to effect their relief and what is expected of them in order to encourage cooperation and efficient action. Friends and relatives outside the affected area need to know what is happening to people that they care about. This serves to reduce community anxiety and lessen fears. Nevertheless, disaster relief workers tend to regard ENG helicopters on the scene as an annoying nuisance at best and downright dangerous and detrimental to their efforts at worst. It is for these reasons that helicopters engaged in ENG should be given serious consideration and an appropriate priority in the helicopter integration plan. They need to be assured of the opportunity to do their job and they should, in turn, assure compliance with the conditions and limitations imposed by the plan and by FAR 91.137.

Fire fighting. Helicopters have two primary functions in their roles as fire fighters. First, they are used to spray or drop fire retardants, chemicals, or water on the fire whether it be in a building or in a forest. This mission usually requires specialized training, external lift, and specialized equipment. It is not recommended that unpracticed, unconfigured, volunteer helicopters be expected to take on this mission. Fire

departments, the U.S. Forest Service, and contract operators hired by the U.S. Forest Service are well trained and equipped to support this mission. The second major helicopter role involves transporting fire fighters to sites from where they can fight the fire with conventional means. By landing on unobstructed high-rise rooftops or in clearings in the woods, normally configured helicopters can be very useful as auxiliary transport for fire departments.

Damage survey. Often, a natural disaster, such as an earthquake, flood, or blizzard, temporarily precludes the use of ground transportation. Helicopters can be an extremely effective means to determine quickly the extent of damage in the affected area so that the authorities can develop comprehensive plans for the disaster relief effort. Information on the scope of the disaster can be transmitted to the command post via radio or even video down-link.

External lift. Just as a helicopter can serve as a substitute for an elevator, it can also serve as a substitute for a crane. If cargo is too bulky to fit inside a helicopter but its weight is within the helicopter's lifting capability, it can be transported externally slung beneath the machine in a net or other containment device. Many helicopters have a special hook apparatus mounted on their underside specifically for this purpose. The hook has safety devices that prevent inadvertent release of the load, and a special control whereby the pilot can release it in an emergency. For helicopters without this equipment, it is still possible to fabricate an external sling with rope and hooks, but this practice is best avoided unless absolutely necessary. The chief advantage of using helicopter sling loads is the speed with which cargo can be picked up and dropped off. The helicopter does not have to actually land in order to do either, but it is necessary to have a crew on the ground at both ends of the trip to assist with cargo handling.

Return of personnel and equipment. Return of personnel and equipment to their respective bases at the conclusion of the disaster situation is considered by many to be a support function. These missions may or may not be accorded a high priority, depending on individual circumstances, agreements, and orders of the incident commander. After a disaster situation it is likely rescue equipment may not be returned immediately to the owning department for several days or even weeks. At this point, the helicopter support missions will have diminished and ground transportation will most likely be used for return of equipment.

Security and crowd control. Police departments have long been aware of the effectiveness of helicopters in patrolling and surveillance work. Helicopters are even more effective performing this mission during a disaster situation because most other modes of transportation may be severely curtailed. From

mobile aerial observation platforms, those responsible for security and the maintenance of law and order can watch for those who might try to take advantage of the temporary disruption in police protection caused by the disaster. Helicopters can spot open routes to safety and relay the information to traffic controllers on the ground.

Also, it is advisable to transport a fireman to the roof of a building being evacuated by helicopter in order to maintain order and prevent panic among the occupants being rescued. This not only helps assure their safety, but that of the helicopter and crew as well.

Inspection tours. Government helicopters would be utilized to transport representatives from the government who will need to inspect the disaster area in order to assess the extent of damage and to show their sympathy and concern for the victims and survivors. Helicopters offer a convenient means to do so quickly and comfortably without interfering with the workers on the ground.

Hazardous material operations. The use of helicopters in a hazardous materials situation should be carefully reviewed by the incident commander. Air operations over or near a hazardous material spill can change the wind direction and speed thus affecting the boundaries of dangerous areas. In addition, it is not recommended that decontaminated personnel be removed from the hazardous materials control area. Because of possible "off-gassing" of the contaminates, transport of these type of people should be avoided. Contaminates can affect the flight crews and rescue personnel ability to function properly.

Livestock support. The benefits of using helicopters in disaster relief work are not limited to aiding people. Valuable livestock, stranded by snow drifts or flood waters, have been sustained with food transported by helicopters.

CHAPTER 2
PLAN PREPARATION

Four planning assumptions were made in formulating these guidelines.

1. There is always the possibility that situational problems such as traffic, debris, floodwater, or location can interfere with deployment of ground transportation in the aftermath of any catastrophe, disaster, or mass casualty incident.

2. Helicopters can be made available in a timely manner from various civil, private, and/or military sources.

3. Participating municipalities have pre-existing disaster response or emergency planning in place and operate under the auspices of the incident command system.

4. Helicopters, because of the limits imposed by weather and availability, should not be considered an essential part of any plan. If the incident commander determines there is a requirement for their use and the community has helicopter assets, then a helicopter response plan can be activated. Spontaneous response by air resources with a sense of "just coming to help out" can not be tolerated.

Basics

The first step for a local emergency management planner in the integration of local helicopter resources in emergency planning is to have a full understanding of any existing plans, agreements, and regulations. Survey all operational procedures, mutual-aid agreements, service limitations, and regulations in the area of jurisdiction. The goal is to integrate helicopters into existing plans and incident command systems, not to change the core of emergency planning which already exists. Once a familiarity of existing plans is acquired, it will be easier to incorporate the elements for helicopter integration. Search out the air medical transport services in the region and get them actively participating in the planning process.

Train first responders in all elements of the plan. Those on the ground using helicopters need to know how to obtain them, how to communicate with them, their landing zone requirements, and their safety requirements. The incident commander (IC) be it a first responder or in later stages the predetermined IC (fire chief, etc.) should be able to assess the emergency situation and determine whether helicopter support is necessary. Depending on the scope of the incident, the IC may activate the air operations branch of the incident command system. It is important to ensure that requestors and emergency operations personnel have

determined there is no ground support means of mitigating or assessing the incident.

Establish a central control point and dispatch center for all helicopter operations. Air operations could be collocated with the primary emergency operations center or command post. Alternatively, air operations could be located separately in a facility that can handle all the parameters of flight operations. For example, the National Burn Victim Foundation (NBVF) in Orange, New Jersey has the American Telephone & Telegraph (AT&T) Flight Operations Center serve as its air operations center. The center should be in the communications network, have defined procedures and protocols, be able to file flight plans, provide weather briefings, and communicate with in-flight helicopters regarding mission assignments and estimated times of arrival (ETA). In addition, it should assign appropriate resources based on the requests of the incident commander.

Alert Levels

It is recommended that three different helicopter alert levels be defined based on the complexity of the disaster being experienced. The alert level will be determined by the incident commander. Figure 2 provides a view of potential resources available at each alert level. One method of defining three different alert levels is based on the number of helicopters required and the what resource ring they are being pulled from.

Level 1 could encompass locally available assets. First tier responders could include hospital-based EMS helicopters, city, state, and government assets. It could then call upon the private and commercial helicopter fleet.

Level 2 could reach to any State or National military resources that may be available. U.S. Army National Guard (ANG) helicopters may be a potential resource. These aircraft could be added to those responding under alert level 1.

Level 3 helicopters could be requested from reserve and active duty military installations. In mass evacuation situations, the military frequently has available the largest helicopters and often can transport 20 or more people at a time.

When either level 1 or 2 is implemented, participants involved in the next higher level should be notified and asked to assume standby status.

It is recognized that many communities already have alert levels and corresponding checklists. Where such systems exist, helicopter response levels should be integrated in a manner that is consistent with the planning doctrine.

FIGURE 2 RESPONSE ALERT LEVELS

Special Response Procedures

As mentioned earlier, it is appropriate to develop procedures for potential disaster scenarios in a particular region. These disasters could be among the following, depending on the community profile:

- airplane crash at or near a local airport;
- natural disasters such as floods, forest fires, tornados, earthquakes, blizzards, or hurricanes;
- hazardous materials spill; and
- high rise building fire.

A procedure outline for a high rise fire is provided in figure 3.

Fire Department(s)
-Conduct survey of all local high-rise building rooftops.
-Publish and distribute directory with drawings, photos, etc.
-Coordinate fire fighting procedures with building management.
-Develop and train crews in special helicopter operations procedures.
-Maintain equipment (rescue nets, rappelling gear, fans, etc.)
-Exercise crowd control on the rooftop during evacuation.

Helicopter Support Units
-Coordinate and cooperate with disaster planning agency.
-Maintain appropriate aircraft configurations.
-Conduct training and participate in full-scale exercises.
-Adopt specified safety and operational standards.

Police Department(s)
-Provide landing zone (LZ) security.
-Provide security in the vicinity of the fire site.
-Exercise crowd control at the fire site.

High-rise Building Management
-Review and agree to the provisions of the plans.
-Maintain available access to rooftop for evacuation.
-Maintain rooftop clear areas and/or emergency helipads.
-Notify fire department of changes and modifications.

FIGURE 3 HIGH-RISE FIRE RESPONSE PROCEDURE

Gary Morris, Deputy Fire Chief; Phoenix, Arizona: "Planning is necessary and required, but often is a paper plan on a shelf and unusable during an actual event. Experience has shown that the best disaster outcome occurred in communities that integrated helicopter operations into daily 'routine' operations and standard operating procedures. These procedures provided expansion capability and became a natural act to expand to disaster level operations - rather than a foreign, unused plan. Integrating these procedures into the incident command system enhanced this 'routine' expansion capability."

CHAPTER 3
AIRCRAFT RESOURCE INVENTORY

A key to the rapid and efficient deployment of helicopter support to a relief or rescue effort is a list of private and commercial helicopter operators that have agreed to commit aircraft support. The objectives of this chapter are to provide guidelines for developing a list of helicopter resources, and to organize that list to facilitate the dispatch of helicopters to the scene of a disaster or mass casualty incident.

Identify and Survey Helicopter Operators

Initially, in obtaining commitments from helicopter operators for disaster relief and rescue operations support, the planning agency should compile a preliminary list of helicopter operators in the area. A survey of each operator should be conducted to obtain commitments and pertinent data regarding key personnel, base of operations, types of helicopters, on-board communications and rescue equipment, mission capability, and operational limitations. This information will be organized into "assistance" categories incorporated into a resource inventory and request checklist so that transportation and rescue requirements can be matched with an operator's capabilities, i.e., external load for bringing in supplies or pulling debris from the disaster scene, litter configuration to carry victims from the scene, searchlight for nighttime damage assessment or locating trapped victims, etc. Knowing whom to call and the type of task the helicopter will be performing will improve the efficiency of the response/rescue process.

Creating a Resource Inventory

The names of helicopter operators are available from several sources locally, regionally, and nationally. An agency might start with the organizations in table 1 in order to reduce the time involved in seeking information.

The agency can order the lists from one or a combination of the organizations and use the information to develop mailing and resource lists. In many cases, computer runs or membership rosters may be obtained free of charge. However, the requestor should be prepared to pay a small fee for computer time to generate a list tailored for his/her region.

In addition, contact the air medical services organization in your area. These services are staffed by persons with up-to-date medical knowledge and scene management knowledge. They tend to know the other existing helicopter resources in the region and the benefits of each. This resource should actively participate in your planning process.

TABLE 1 RESOURCE INVENTORY SOURCES

Source of Information	Type of Information Available
Federal Aviation Administration Mike Moroney Aeronautical Center Aircraft Registration Branch P.O. Box 25082 Oklahoma City, OK 73125 405-747-3131	Aircraft owners by state, county, helicopter make and model. Helicopters may or may not be based in the same area as local owner/operator.
Helicopter Association International (HAI) 1619 Duke Street Alexandria, Virginia 22314 703-683-4646	Member operators, helicopter types, missions by state. List of regional helicopter associations to contact for more detailed information.
National Business Aircraft Association 1200 18th Street, N.W. Washington, D.C. 20036 202-783-9000	Member operators by state, helicopter types and mission.
State Aeronautics Divisions See individual state listings under Aeronautics Commissions or Authorities or Divisions under state Departments of Transportation in the telephone directory. organizations.	Aircraft owners by county. Type of helicopter available in state where there are aircraft registration requirements. List of helicopter operator
Yellow Pages under Aircraft Charter, Lease or Rental	Helicopter operators.
Airborne Law Enforcement Association 601 East Fayette Street Baltimore, MD 21202 301-396-2431	Public service helicopter operator members.
Association of Air Medical Services 35 S. Raymond Avenue, Ste 205 Pasadena, CA 91105 818-793-1232	Hospital and EMS helicopter operators.
National Broadcast Pilots Association c/o Biscayne Helicopters 12760 S.W. 137th Ave Miami, FL 33186 305-252-3883	Helicopter operators in the broadcast media.
Emergency Volunteer Air Corps 2617 Prosser Avenue Rancho Park, CA 90064-3327 213-837-0762	Organization of general aviation and personnel to be of service during disasters and other public emergencies.
National Burn Victim Foundation 3234 Scotland Road Orange, N.J. 07050 201-676-7700	Unique medical disaster response system designed to coordinate and facilitate the rapid transportation of skilled medical personnel, supplies, and equipment to thermal disaster sites.

Resource Survey

It cannot be assumed that every operator within a region is willing to devote helicopter support to a relief operation on demand. Developing a reliable resource list that can be used at the time of an emergency will, therefore, be dependent on surveying each operator in advance to determine the level of commitment and detailed information regarding helicopter resources.

The emergency planner should understand that helicopters should only be assigned to tasks which they are capable of providing. Operators may not be willing or able to provide helicopter support to perform all of the missions required for the relief effort due to limitations by schedule (e.g., the helicopter is out on a current mission); by operational constraint (e.g., the pilot cannot perform the flight or the aircraft is down for maintenance); federal regulation or insurance limitations (e.g., the helicopter: 1) cannot perform sling loading, 2) cannot transport patients by external loads, or 3) is not equipped to transport litters). When requesting helicopter support, special attention should be given to the types of services the operator is willing to provide and a procedure should be established for backup resources when or if a helicopter is unavailable.

One of the objectives of using a survey technique to obtain an operator "profile" is "task matching," where the air operations center requests helicopter support in consideration of its equipment and capabilities. Figure 4 is a sample helicopter resource survey data form which could help in the data gathering effort. The types of data and a description of their purpose are provided in the following text.

1. **Name, address, and telephone number of the operator's base of operations.** This information should also include: fax numbers for immediate distribution of flight operations, ingress into and out of landing zones, locations of staging areas or emergency landing zones, and cellular telephone numbers in the event land line transmission becomes impossible.

2. **Point of contact (should be on a 24 hour basis) and after hours telephone number.** This person should be a key person that has the authority to dispatch helicopter and staff support to the disaster scene. This may or may not be the chief pilot.

3. **Additional points of contact (in the event the first line of authority is unavailable).** In some cases the first point of contact may be unavailable and a second in command will need to be identified. Think of a worst case

For Agency Use Only
Region: NW___ NE___
SW___ SE ___
Dispatched:
Yes___ No___
Launch Time:___:___
Return Time: ___:___

Name of Operator:______________________Tel Number:_________Fax Number:_________
Address (or base of operations):______________________________
After Hours Telephone Number(If different than daytime phone):______________Cellular Phone:_________
1st Point of Contact:______________________________Telephone:_______________
Must have authority to dedicate helicopter resources to relief activity
2nd Point of Contact:______________________________Telephone:_______________
Must have authority to dedicate helicopter resources to relief activity in the event 1st point of contact is unavailable
Flight Operations Manager or Chief Pilot:______________________Telephone Number:_______________

List helicopters that company can dedicate to relief operations and complete or check relevant information:

Make and Model N#	Communications	Base of Ops	# Crew / # Pax	# Litters that can be carried	Pay-load in Lbs	Re-sponse Time / 50 NM Hr:Mns	Duration of Flight Time in Hrs/mins Fuel Used	Special Equipment:	Mission Capabilities	Helicopters dispatched
___ ___	VHF___ UHF___ Loran___ RNAV___ Xpond___	___	___ ___	___	___	___	___ Jet A___ 100 LL___	Cargo Hook ___ Aerial Photo ___ Searchlight ___ FLIR ___ Public Address ___ Hoist ___ Emergency Med. Kit___ Rescue Net ___ Other(list) ___________	Passengers Only___ Litter/Aeromed___ External Load___ Damage Assessment___ Supplies___	Date ___ Time Out___ Mission___ Time In___ Call Sign___
___ ___	VHF___ UHF___ Loran___ RNAV___ Xpond___	___	___ ___	___	___	___	___ Jet A___ 100 LL___	Cargo Hook ___ Aerial Photo ___ Searchlight ___ FLIR ___ Public Address ___ Hoist ___ Emergency Med. Kit___ Rescue Net ___ Other(list) ___________	Passengers Only___ Litter/Aeromed___ External Load___ Damage Assessment___ Supplies___	Date ___ Time Out___ Mission___ Time In___ Call Sign___
___ ___	VHF___ UHF___ Loran___ RNAV___ Xpond___	___	___ ___	___	___	___	___ Jet A___ 100 LL___	Cargo Hook ___ Aerial Photo ___ Searchlight ___ FLIR ___ Public Address ___ Hoist ___ Emergency Med. Kit___ Rescue Net ___ Other(list) ___________	Passengers Only___ Litter/Aeromed___ External Load___ Damage Assessment___ Supplies___	Date ___ Time Out___ Mission___ Time In___ Call Sign___
___ ___	VHF___ UHF___ Loran___ RNAV___ Xpond___	___	___ ___	___	___	___	___ Jet A___ 100 LL___	Cargo Hook ___ Aerial Photo ___ Searchlight ___ FLIR ___ Public Address ___ Hoist ___ Emergency Med. Kit___ Rescue Net ___ Other(list) ___________	Passengers Only___ Litter/Aeromed___ External Load___ Damage Assessment___ Supplies___	Date ___ Time Out___ Mission___ Time In___ Call Sign___

Operational Limitations: Describe any limitations that might interfere with participation in the Disaster relief/rescue effort:
IFR Flight: Are helicopters/flight crew certified for IFR operations? Yes____ No ____.
Night Flight: Are there any missions that are prohibited for night flight? ______________________
Geographical(range of operations limitations)or Other :______________________
Minimum Landing Area Requirements ______________________

FIGURE 4 SAMPLE HELICOPTER RESOURCE SURVEY DATA FORM

situation, i.e., a holiday weekend and list as many contacts as you have available.

4. **Name and telephone number of flight operations manager or chief pilot.** Information regarding helicopter mission, air traffic control, radio frequencies, flight hazards, landing zones, and traffic patterns should be transmitted to this individual in advance of dispatch if possible.

5. **Number, make, and model of helicopters and their mission capability.** Each helicopter, along with the registration or "N" number, should be listed. Additionally, the number of passengers that can be carried or special equipment that is available should be identified so that the helicopter can be matched with the relief/rescue task.

6. **Base of operations and response time per 50 nautical miles.** A critical factor in the dispatching of helicopters will be their location in relationship to the scene. The helicopter's base must be identified to facilitate the response. The agency will also need to know how long it will take the helicopter to arrive at the scene based on block speed (lift-off to touchdown) of that particular helicopter. Helicopter speeds vary depending on make and model. Helicopter support should be requested considering the mission requirement or task the helicopter will be performing and the amount of time it will take to arrive at the scene.

7. **Duration of flight.** Mission assignments will have to consider when refueling and change of aircrew are required. Knowing the duration of flight will assist the air operations director in programming resources over a given period of time.

8. **Additional operational requirements.**

   a. Load capacity.

      1. Passengers. Number of ambulatory (able to walk) passengers the helicopter can carry.
      2. Litter Patients. Number of litters the helicopter can accommodate.
      3. Payload. Amount of weight, including both supplies and passengers, the helicopter can safely carry under standard conditions.

   b. Fuel requirements. It may be possible to have a staging area close to the scene where helicopters can be refueled. A tanker truck carrying the required fuel such as Jet A or 100 Octane can be positioned at the staging area to eliminate time-consuming ferry flights

back to an airport or base. Helicopter operators may want to bring their own consumables if extended operations are planned. Consumables would include oil, hydraulic fluid, transmission fluid, etc.

c. Size of landing area required. Helicopter operators may require larger minimum landing zone sizes than the width of two rotor diameters (see chapter 5). Special requirements should be noted by the helicopter operator.

d. Operational limitations. There are several limitations to operating helicopters.

1. Geographical locations of the scene. A particular helicopter operator may not wish to operate outside of a specified radius.
2. Political. Jurisdictions or command hierarchies may require certain helicopter resources be called out in a particular order such as police, first; hospital helicopters, second; private resources, third; Army National Guard, Army, or Coast Guard, fourth, etc.
3. Environmental. This field denotes whether the helicopter is certified for flight in inclement weather (reduced visibility, winds) or whether the operator has a corporate/company policy of no instrument flight rules (IFR) or nighttime flight. In addition, altitude restrictions are very important in some parts of the country.
4. Personnel. Personnel qualified to conduct operations under the environmental conditions must be taken into consideration.

e. Specialized equipment. Each operator may have the ability to perform a variety of tasks beyond carrying passengers. Generally, this is related to special equipment or a helicopter configuration which is beneficial for a special job.

1. Searchlight. Use in night operations to locate victims, assess damage, spotlight potential landing areas or hazards which should be removed.
2. Rescue net. Rescue net carried from tether underneath helicopter or hoist (either externally or internally mounted).
3. Forward Looking InfraRed (FLIR). Sensor used for locating victims, potential landing area evaluation.
4. Cargo hook. Supplies or litters can be carried inside or outside of the helicopter, using a tether suspended from the helicopter. Useful in areas

where conditions prevent the helicopter from landing. Consult FAA FAR for applicability to each type of operator.

5. Aerial photographic pod. Useful for filming disaster scene for developing disaster relief control maps, pinpointing landing zones, identifying pockets which need first priority for cleanup or rescue.

There may be other types of special equipment such as floats or rappelling devices. Each survey form should leave space for an operator to advise the agency of any of these other specialized capabilities that would enhance a rescue or relief mission.

f. Communications. There are four elements of communications requirements.

1. On-board communications equipment. This would include UHF, VHF, cellular phones, and video camera equipment.
2. Ground communications equipment. Includes cellular phones, shortwave radio, and facsimile machines.
3. Communications frequencies. Established emergency frequencies are needed for air operations, ground operations, and medical/rescue information exchange.
4. Call sign assignment. The air operations center will designate special call signs if other than helicopter registration number (N-number).

On-Board equipment. Civil and public service helicopters may have different types of equipment supporting either VHF (civil aviation) or UHF (military aviation), or both. The airborne command/control helicopter or aircraft should have the capability to transmit and receive both bands.

Ground equipment. In the event phone service is disrupted due to equipment problems, microwave cellular phones may bridge the disruption by maintaining phone communication to the helicopter base. Shortwave radio may also augment the communications network. Facsimile machines will be essential if control maps, special procedures, and frequencies can be transmitted before deployment of the aircraft.

Emergency communications frequencies. The use of separate channels facilitates a more efficient management of aircraft operations and the medical/ rescue network. Segregating the communications net

helps prevent potential conflicts forced by sharing radio frequencies.

Predetermined call signs. A procedure for determining helicopter call signs that identify the helicopter as a participating aircraft during a disaster activity should be established and documented in the plan. This aids the agency performing air traffic control, either the FAA Air Traffic Control facility closest to the scene or an airborne "air control" helicopter, in separating the rescue helicopters from the general flow of traffic.

One method of designating call signs could use the last three digits of the helicopter's registration number, (e.g., N9462S), preceded by the identifier "Lifesaver" or "Rescue," resulting in the call sign, "Rescue 62-Sierra." (Sierra is the phonetic code for the letter S. The Phonetic alphabet is used in all aviation call signs.) Another means of assigning special aircraft call signs is that of combining the role of the helicopter with part of the aircraft registration number and the number of persons the helicopter can rescue or transport, i.e., "04" or "09." For example, if the aircraft registration number is N9462S and it can carry no litters and two passengers the call sign would be "Lifesaver 2-Sierra-0-2."

Whenever possible, the helicopter will be preassigned a call sign for use during relief/rescue operations. The planning coordinator responsible for managing the helicopter inventory should advise the helicopter operators of the call signs when they are assigned and reconfirm them upon dispatch.

A sample survey form is illustrated in figure 4. This has been created as a guide for the planning agency in developing a form which is easily tailored to its emergency plan. It is recommended that the completed data be automated (computerized) so that the information can be sorted using a variety of "fields," such as region (NE, NW...), mission (supplies, medical, passenger...), special equipment (helicopters with "floats" for water rescue, FLIR for locating victims), or disaster type (high-rise fire, earthquake). The ability to focus on relevant data at the time of emergency can improve the efficiency of the response operation.

Conducting The Survey

Conducting a survey can be easily accomplished using the initial helicopter inventory list developed from information received from one or more of the listed organizations. This activity will

involve at least six steps in order to get a final list of participants.

1. Develop initial list of helicopter operators.
2. Create survey form.
3. Mail survey form to operators with the following information:

    a. cover letter describing the nature of the project,
    b. advise and highlight deadline for responding, and
    c. contact person for answering questions or further describing the program.

4. Receive survey forms and, if necessary, retype information onto final form.
5. Send the operator a copy of the final helicopter inventory data form to verify the information.
6. Place forms in binder for air operations center. Forms should be organized to match task with capability.
7. Establish a periodic report cycle for currency of information.
8. Make determination for registration of emergency workers and whether reimbursement is required.

Verification and Updating

The resource inventory will be a compilation of those data forms from operators willing to participate in disaster relief and rescue programs. Therefore, only forms from committed operators should be maintained in the disaster relief plan file.

Final data forms should be verified by the operator so that there are no transpositions, errors, or misunderstandings as to the operator's commitment and use of helicopters. The data forms can also be used for updating by merely copying them and sending them to the individual operators for revision or continued commitment to the program.

CHAPTER 4
COMMUNICATIONS

Essential to all disaster relief efforts is an effective communications capability to deploy helicopters in support of emergency operations. The nature of the communications system will be directly related to the magnitude of the particular emergency situation. This chapter will focus on the need and methodology for establishing an organized network of communications to facilitate the implementation of a helicopter support plan for disaster relief.

Definitions of Terminology, Phraseology, and Acronyms

The various participants in the disaster relief effort employ a set of terms and phrases unique to their operation and information processing. Additionally, the use of acronyms (abbreviations) do not always hold the same meaning for all responders. Medical personnel use an entirely different "vocabulary" to describe physical conditions and treatment. And terms like "departing the fix" are meaningful only to the pilot and the controller. Because of these distinctions, individuals operating the communications equipment should strive to eliminate the use of jargon and acronyms and thus the potential for misinterpretation. Communicate concisely, clearly, and effectively to your fellow emergency workers.

Establish an Emergency Communications Net

The flow of information from initial request for helicopter services to the scene must be outlined so that the appropriate organizations and resources can be notified and dispatched. Figure 5 illustrates a hypothetical communications network for requesting and managing helicopter support.

Figure 5 highlights the fact that one entity should be responsible for dispatching helicopter support and managing the helicopter resources as the relief effort responds to the disaster. Information is relayed to the command post as the demand changes. Advisories which alter the level of support are noted sequentially through the net on a continuing basis. The following is a brief explanation of the roles of each entity in the network.

Command Post. The command post (CP) is the initial contact point that receives notification of the disaster and requests activation of the disaster plan. Generally, this represents the community's communications clearing house or an emergency number where alerts can be issued to authorities. Additionally, as the plan is implemented and needs are identified, requests for additional services are made through the command post as the central contact point.

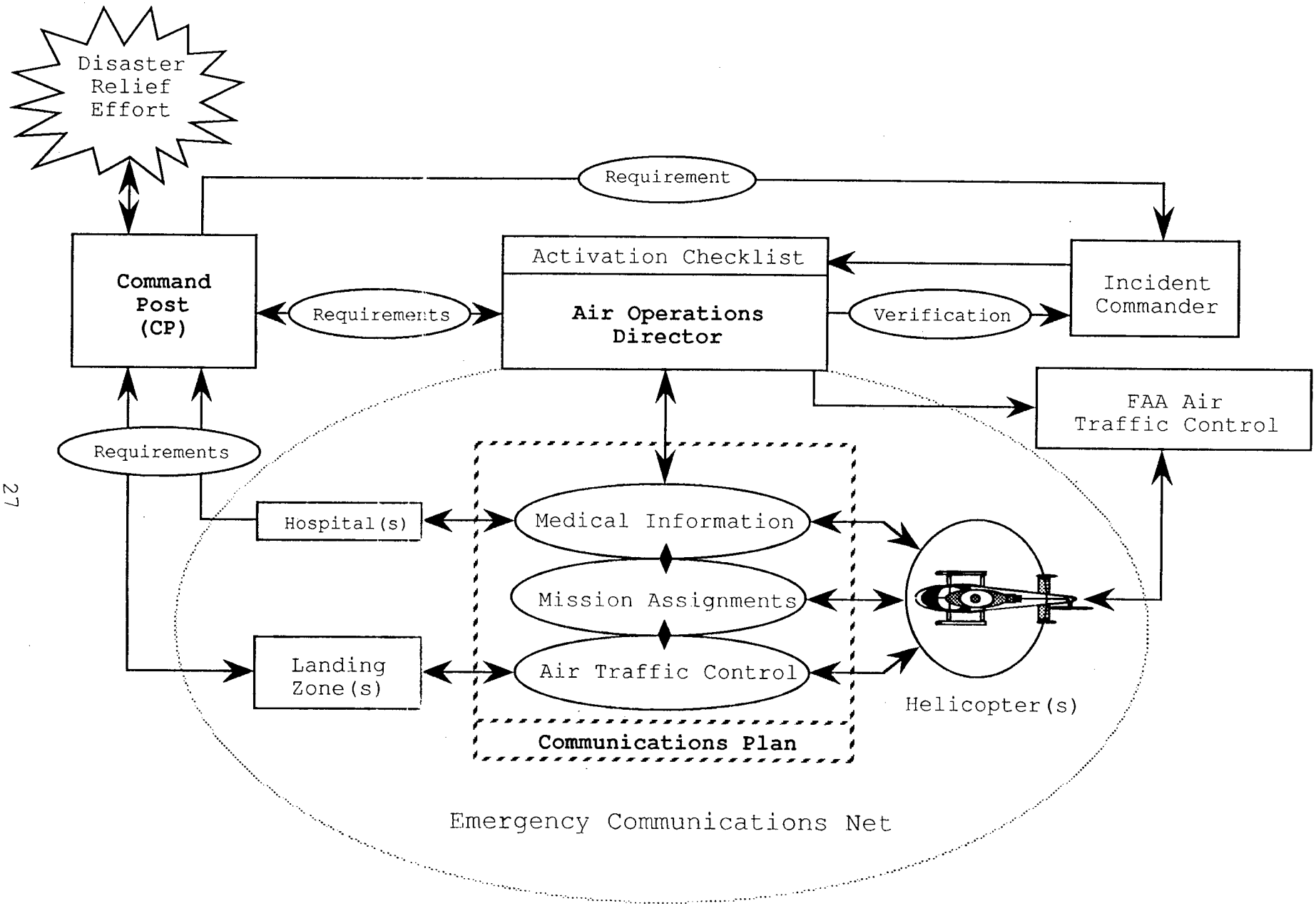

FIGURE 5 HELICOPTER COMMUNICATIONS SYSTEM

Incident Commander. The incident commander is the individual in charge of implementing the emergency operations plan. This authority notifies appropriate city/county staff members and department heads of the action and requests their assistance in "turning on" various emergency operations. The incident commander or the delegated representative determines the need for aircraft support and provides information regarding the disaster or emergency to the air operations center. This information includes:

1. type of disaster,
2. alert level,
3. location of disaster,
4. anticipated number of people requiring rescue or rapid transport,
5. types of helicopter support needed,
6. location of staging areas and/or landing zones,
7. weather at landing zone including wind speed and direction if possible, and
8. possible landing hazards.

Air Operations Center. The air operations center will receive, then verify the request from the incident commander. Depending on the requirements, the air operations center may then communicate with the command post for further operational and support requirements. The air operations center director should be familiar with helicopters and their capabilities, be able to weigh operational risks, and be experienced in making decisions under pressure. The air operations director is responsible for implementing the helicopter communications plan. The air operations center will advise, designate, or request air traffic control assistance from the FAA or in some cases the airborne air traffic controller. In addition, the air operations center will request helicopter support; determine the types and numbers of helicopters needed; determine the anticipated duration of assignment; establish mission priorities; assess flight crew relief; organize ground support and security for helicopter landing zones and staging areas; arrange for fuel trucks for sustained operations at staging areas; coordinate aircraft on the ground, in the air, at hospitals, and at staging areas; and disseminate information such as control maps, frequencies, geographical coordinates of landing zones and staging areas, hazards, call numbers and personnel in charge. In the event a heliport directory does not exist, the latitude and longitude and/or notable landmarks will be given to the helicopter pilot.

The air operations center not only provides a bounty of information but also continuously monitors activities and information from helicopter crews, medical crews, hospitals, air traffic control, and command and control operations. All this information will be used for assessing further operational requirements as details of the disaster are known and the

relief/rescue effort progresses. Air operations may also shift staging areas, casualty collection points, hospitals, and emergency landing zones as required.

Federal Aviation Administration/Air Traffic Control (FAA/ATC). Although airspace restrictions relate to air traffic control, it is one of the first actions to take place when aircraft are used in the relief effort. The ability to set aside airspace over the scene so that the normal flow of traffic is routed away from the area is authorized by Federal Aviation Regulation 14 CFR Part 91.137. This regulation provides for the immediate establishment of temporary restricted airspace, so that air operations can be conducted safely during a relief and rescue effort. It will be important for air operations to determine the need for and the extent of restricted airspace through discussions with appropriate personnel. Air operations will request that the nearest FAA/ATC authority restrict the airspace involved. In making the request, air operations will be required to provide the following information:

1. identify the location and reason for declaring FAR 14 CFR 91.137,
2. duration of expected restriction - a time frame can be estimated or the restriction can be active "until further notice,"
3. altitudes affected - these may be dictated by the nature of the disaster, winds, spatial arrangement and heights of buildings, number of aircraft needed for rescue operations, etc., and
4. who will be directing relief activities.

Further information on the types of restrictions and related procedures is available in FAA Handbook 7930.2C "Notices to Airmen," chapter 8, Flight Data Center NOTAM Procedures, section 88-1,b and 8-3. The regulation authorizing the establishment of restricted airspace may be reviewed in 14 CFR Part 91.137, Temporary Flight Restrictions.

Communications Plan. Smooth interaction among the medical and rescue units with helicopter support activities and the prioritization of multiple relief requests comprise the most complicated and dynamic tasks of the communications plan. Ideally, the communications plan will help evaluate the initial estimation of damage and assignment of resources and perform continuous reassessment of these factors and their impact on the level of support. The accuracy of the information exchanged is the basis for making weighted control decisions regarding the resources required for mitigating the disaster. The communications plan is comprised of at least three information components.

1. Medical information. Medical information and tracking consists of patient information including name, means of transport, medical status, and destination. The air operations center assesses the requirements to transport medical personnel and special medical supplies or equipment. It also determines bed availability and assignment of receiving facilities.

2. Mission assignments. Mission assignments include operations, landing zone designation, assessment of rescue efforts, and specification of disaster relief requirements.

3. Air traffic control. Air traffic control consists of information from the FAA and potentially an airborne air traffic controller (i.e., police helicopter). The airborne air traffic controller will advise and sequence helicopter traffic in and out of the landing zone and staging areas. The airborne air traffic controller will also receive requests from air operations regarding the distribution of outgoing helicopter traffic to hospitals, staging areas, and landing zones. In addition, the airborne air traffic controller will coordinate with FAA air traffic control as necessary. FAA ATC will control the restricted airspace, issue NOTAM's, and support the operations on a more general level.

A key to the exchange of information in the communications chain is the establishment of separate, autonomous frequencies for medical, air, and ground operations. Frequency congestion during the time of a disaster could pose conflicts in the transmission of vital information or impede traffic control to areas where needed. It is important that among the various operational components there be discrete emergency frequencies dedicated to each function. The command post and the air operations center should have the ability to monitor these frequencies simultaneously for reporting or requesting changes to the support levels. As hospital facilities reach saturation or landing zone requirements are relayed to the command post, shifts or new demand levels in resources can be made. Figure 6 summarizes some of the participants, the type of information being relayed, and the frequencies which are commonly used.

Establish Procedures and Protocols

Avoiding chaos and unnecessary radio traffic in the relief effort is a primary objective of writing and adopting a disaster relief plan. Determining who is in charge and what logical set of procedures should be carried out will help eliminate the confusion that can often accompany the sudden occurrence of a disaster. Every jurisdiction and mission should have written, established procedures in place for the smooth coordination,

INFORMATION	AIRBORNE ATC TO PILOT	FAA TO PILOT	LZ CONTROL TO PILOT	AO TO PILOT	LZ CONTROL TO AIR CONTROL	LZ CONTROL TO AO	AO TO LZ CONTROL	AO TO HOSPITAL	AO TO POLICE	CP TO AO	MED CREW TO HOSPITAL	HOSPITAL TO AO	PILOT TO AO	PILOT TO CP	PILOT TO AIRBORNE ATC
FAA Air Traffic Control		UHF, VHF													
ETA Landing Zone							UHF, VHF, FM		UHF, VHF				UHF, VHF	UHF, VHF	
Landing Zone Conditions: Windspeed/Direction Lighting/Availability			UHF, VHF, FM		UHF, VHF, FM	UHF, VHF, FM									UHF, VHF
Landing Zone Coordinates/ Landmarks			UHF, VHF	UHF, VHF, FM	UHF, VHF	UHF, VHF				UHF, VHF, FM					
On-Scene ATC of Landing Zone	UHF, VHF				UHF, VHF, FM				FM, Cellular, Phone						
Alert Notification				UHF, VHF, Cellular, Phone											
Damage Assessment													UHF, VHF, Video		
Mission Assignment				UHF, VHF											
Mission Requirements										FM, Cellular, Phone					
Security/Ground Control											FM, Cellular, Phone				
ETA Hospitals							FM, Cellular Phone			FM			FM, UHF, VHF		
Hospital Resources															
Patient Status										FM					

AO = Air Operations CP = Command Post

FIGURE 6 COMMUNICATIONS MATRIX

control, and performance of rescue operations. Protocols should be specific to avoid misinterpretation of authority for requesting resources and controlling various activities relating to the disaster scene. Because different types of disasters often dictate different requirements, the procedures should also be flexible to be responsive to the specific disaster at hand.

It is advisable that protocols be organized by disaster type, controlling agency, and support mission capabilities of the helicopter operators. Protocols and procedures should focus on the areas of information inherent in the communications net. In addition, regular exercise of the plan is just as important as the development of the plan.

Medical Information

There are many types of medical information which are critical to the relief and rescue effort including evaluation of injuries and special equipment needs. There could be the requirement for communication of the following medical information components:

1. the command post or emergency operations center for alerting the medical community, i.e. hospitals, flight helicopter operators, physicians, Red Cross, and volunteer agencies;
2. the disaster scene, regarding location of victims;
3. the medical control unit to request special equipment, specify patient care, transport requirements, and changes in bed availability;
4. the triage area for treatment, stabilization, and priority for transport;
5. the landing zone for special transport instructions depending on the severity of injury;
6. the air operations center to the receiving facility for patient condition updates, helicopter ETA, bed availability, and enroute care requirements; and
7. the log for problems or deviations from established procedures including causes or rationale behind deviations and results. Pictures and video may enhance the recall process during a post incident analysis.

Air Traffic Control

Air traffic control will likely be conducted using either a local ATC facility or aerial based controllers. A combination of FAA/ATC and an airborne controller may be necessary. Procedures will include:

1. determining the agency who will control air operations at the disaster scenes;
2. coordinating with the FAA/ATC on when and where to "hand off" aircraft;

3. providing "fixes" for landing zones or staging areas or advising air operations of landmarks for ground reference in locating the site(s);
4. determining traffic flow and advising command post and air operations of patterns in advance of dispatch, if possible;
5. sequencing aircraft for landing at landing zones or staging areas;
6. controlling departing aircraft to a disaster support area, a receiving facility, or a hand-off point to FAA/ATC for further guidance to intended destination;
7. controlling the flow of observation/surveillance helicopters or approved broadcast media aircraft within or around the disaster scene if allowed under 14 CFR 91.91;
8. providing simultaneous damage assessment to command post for further allocation or management of relief resources; and
9. maintaining log on problems or deviations from established procedures including causes or rationale behind deviations and results - pictures and video may enhance the recall process during debriefing.

Mission Assignment

Mission assignment functions from air operations may be ground-side or airborne depending on the resources available at the time of the disaster. The duties of mission assignment can be more easily described as a command and control function which may encompass damage assessment, resource requirements and requests, air traffic control, and resource management. The functions include the areas below. The director will:

1. manage emergency operations and aircraft mission assignments;
2. determine the agency that will provide aircraft for use in airborne air traffic control;
3. prioritize activities based on alert levels, i.e. determine airspace requirements, advise authorizing agency or nature and extent of damage, and call for ground and airborne support, etc.;
4. provide damage assessment and notify command post of resource requirements and available staging areas close to scene;
5. advise command post and manage resources as relief requirements shift from one area to another or as the need for support diminishes to adjust the response levels; and
6. maintain a log on problems or deviations from established procedures including causes or rationale. Pictures and video may enhance the recall process during the post-incident analysis.

Documentation

Organization and education are the keys to efficient response requirements at the time of the disaster. The plan will serve as a guide during times of emergency and will also be valuable as a training tool for new personnel assigned to disaster relief and for exercises. The communications plan should be located in the overall disaster relief plan as a separate tabbed section. Sections of the communications plan should generally follow the outline below and will enhance both the training, exercises, review, and real-time disaster relief process. The following list details the communication plan elements:

1. definitions and acronyms for understanding disaster, aircraft, medical, and radio terminology and phraseology;
2. organizational flow chart, general description of responsibilities for each component of the communications network;
3. step-by-step process in requesting resources based on alert levels;
4. telephone and radio frequency lists of communications authorities by network component, participating helicopter operators (including government flight operations), facsimile numbers, frequencies for UHF/VHF, FM, AM, shortwave, citizen's band, cellular telephone numbers, etc.;
5. communications equipment requirements for emergency use based on relief/rescue role;
6. instructions on assigning call signs for new volunteer helicopter operators;
7. sample briefing documents or forms that can be easily completed and hand delivered or faxed to authorities, dispatch centers and/or helicopter operators;
8. responsibilities and procedures for each participant in the disaster relief effort;
9. responsibilities and procedures for each mission type for new participants; and
10. control maps that can be marked up for identifying staging areas, landing zones, or relief areas distributed to participants.

CHAPTER 5
LANDING AREAS

Selection Criteria

Helicopter operations within the context of a disaster or MCI relief effort will require the strategic use of landing areas in proximity to the scene. Depending on the mission these can be one of three sites: existing heliports (public or private), predesignated emergency landing areas, or an on-demand temporary facility to be used specifically for relief activities. This chapter discusses the general criteria for establishing landing areas. It should be understood that the criteria in this chapter refer to temporary facility establishment.

Before heliports and emergency landing sites can be established in support of the helicopter integration plan, it is first necessary to determine specific site selection and/or approval criteria for such landing zones. This makes it possible to recognize candidate sites for designation as emergency landing zones and to standardize, to the extent possible, helicopter emergency facilities for maximum safety and utility.

The FAA has published recommendations for heliport design and construction in an advisory circular (AC) entitled "Heliport Design," AC 150/5390-2C. The criteria contained in this AC are advisory in nature and not binding on the public, unless it is incorporated in ordinances or regulations. It does, however, represent the best government and industry consensus of the minimum requirements for a safe and functional heliport. It is within the prerogative of any jurisdiction to impose additional or more stringent criteria on heliport establishment, over and above those contained in the AC, but it is generally not necessary nor recommended. Further information on heliports may be obtained from the resources listed in Table 2.

Heliport site selection and design criteria are basically matters of common sense. The three fundamental requirements for any helicopter landing facility are a suitable surface on which the aircraft can land and occupy prior to takeoff; at least one clear approach and departure path, free of obstructions and obstacles; and an indicator to show the pilot wind direction and velocity. All heliports have these three characteristics as a minimum. Embellishments on these basic requirements are usually a function of the purpose of the facility, how much money is available to develop it, and how much it will be used. In a disaster situation with multiple helicopters participating, it is desirable to have established multiple approach and departure paths into the landing zone. This allows delays to be kept at a minimum and safety at a maximum.

TABLE 2 HELIPORT INFORMATION SOURCES

Professional and/or industry associations

Airborne Law Enforcement Association (ALEA)
8060 Balboa Boulevard
Van Nuys, CA 91406
818-781-5087

Aircraft Owners and Pilots Association (AOPA)
421 Aviation Way
Frederick, MD 21701
301-695-2000

American Helicopter Society (AHS)
217 N. Washington Street
Alexandria, VA 22314
703-684-6777

Appalachian Helicopter Pilots Association
c/o Pittston Coal Company
P.O. Box 4000
Lebanon, VA 24266
703-889-4000

Association of Air Medical Services (AAMS)
35 S. Raymond Avenue
Suite 205
Pasadena, CA 91105
818-793-1232

Bay Area Heliport Council
c/o Aris Helicopters
1138 Coleman Avenue
San Jose, CA 95110
408-998-3266

Eastern Region Helicopter Council (ERHC)
c/o Schering-Plough Corporation
Linpro Jet Centre
Morristown Municipal Airport
Morristown, NJ 07960-4648
201-539-1840

Emergency Response Institute, Inc,
4537 Foxhall Drive, N.E.
Olympia, WA 98506
206-491-7785, 509-782-4832

TABLE 2 HELIPORT INFORMATION SOURCES
(CONTINUED)

Hawaii Helicopter Operators Association
1778 Ala Moana Boulevard
Honolulu, HI 96815-1605
808-836-1566

Helicopter Association Northwest
c/o Elliott Bay Aviation, Inc.
8535 Perimeter Road South
Seattle, WA 98108
206-767-3290

Helicopter Association International (HAI)
1619 Duke Street
Alexandria, VA 22314-3439
703-683-4646

1. The Helicopter Annual: A comprehensive guide to the helicopter industry including helicopter specifications, industry statistics, operator and manufacturer listings, and key government and industry contacts worldwide.
2. Directory of Heliports and Helistops: A complete listing of public/ private use heliports and hospital heliports in the United States.

Helicopter Association of Florida
c/o Crescent Airways, Inc.
7501 Pembroke Road
Hollywood, FL 33023
305-987-1900

Helicopter Operators of Texas
c/o Houston Police
Helicopter Patrol
8402 Larson-Hobby Airport
Houston, TX 77061
713-641-0281

Metroplex Helicopter Association
c/o Aerospatiale Helicopter
2701 Forum Drive
Grand Priarie, TX 75053-4005
214-641-0000

Michigan Helicopter Association
P.O. Box 2613
Southfield, MI 48037
313-669-3080

TABLE 2 HELIPORT INFORMATION SOURCES
(CONTINUED)

Mid-Atlantic Helicopter Association (MAHA)
12826 Dover Road
Reistertown, MD 21136
301-682-5400

National Association of State Aviation Officials (NASAO)
Metro Plaza One
8401 Colesville Road, Suite 505
Silver Spring, MD 20910
301-588-0587

National EMS Pilots Association (NEMSPA)
P.O. Box 8272
Rapid City, S.D. 57709
605-341-0273

New England Helicopter Pilots Association
P.O. Box 88
Bedford, MA 01730
617-973-7181

Northwest Rotorcraft Association
111 S.W. Fifth Avenue, Suite 3500
Portland, OR 97204

Ohio Helicopter Pilots Association
c/o WBNS-TV
770 Twin Rivers Drive
Columbus, OH 43216
614-460-3769

Professional Helicopter Pilots Association of California (PHPA)
P.O. Box 9558
Glendale, CA 91206
805-496-0986

Western Helicopter Safety Advisory Council
P.O. Box 1337
Provo, UT 84603
801-375-1124

TABLE 2 HELIPORT INFORMATION SOURCES
(CONTINUED)

Regional Heliport Development Coordinators

The FAA has designated Regional Heliport Development Coordinators to assist in carrying out mission responsibilities in the area of heliport development. Cocrdinators are listed below.

FAA New England Region
Weedon Parris (ANE-6101)
12 New England Executive Park
Burlington, MA 01803
617-273-7053

FAA Eastern Region
Al McDonough (AEA-630)
Fitzgerald Federal Building
John F. Kennedy International Airport
Jamaica, NY 11430
718-917-1966

FAA Southern Region
Charles V. Prouty (ASO-620D)
3400 Norman Barry Drive
East Point, GA 30344
404-763-7756

FAA Great Lakes Region
Benito DeLeon (AGL-611.2)
2300 East Devon Avenue
Des Plaines, IL 60088
312-694-7531

FAA Southwest Region
Department of Transportation/ Federal Aviation Administration
ATTN: Hugh Lyon (ASW-611C)
Fort Worth, TX 76193-0611
817-624-5600

FAA Northwest Mountain Region
Cecil Wagner (ANM-610)
1601 Lynd Avenue, S.W.
Renton, WA 98055-4052
206-227-2610

FAA Central Region
Roland Elder (ACE-611)
601 East 12th Street, Federal Building
Kansas City, MO 64106
816-426-6921

TABLE 2 HELIPORT INFORMATION SOURCES
(CONTINUED)

FAA Western Pacific Region
Haime Duran (AWP-611.4)
15000 Aviation Boulevard
Lawndale, CA 90261
213-297-1538

FAA Alaskan Region
Floyd Pattison (AAL-610)
701 C Street, Box 14
Anchorage, AL 99513
907-271-5440

Additional Sources of Information

Federal Aviation Administration
800 Independence Ave., S.W.
Washington, D.C. 20591

- Vertical Flight Special Program Office (ARD-30) 202-267-8759
- Office of Airport Planning and Programming, National Planning Division (APP-400) 202-267-3451
- National Flight Data Center (ATM-610) 202-267-9277

The heliport design advisory circular contains more specific and detailed criteria for these specific aspects of heliport design.

What follows is a general discussion of the points that should be taken into consideration when designing or designating helicopter landing sites, regardless of whether the facility is permanent or temporary, extensive or simple.

Logistical Support. Long term operations require support in the areas of fuel, maintenance, flight crew food, fluids, rest, etc. Planning must reflect these needs and provide a means of obtaining the necessary resources. The incident command system has these logistical support requirements built into it.

Location. When selecting the location of an emergency use helicopter landing zone, whether temporary or permanent, bear in mind the ultimate purpose of the facility. Landing zones near the disaster site and the emergency room entrance at the receiving hospital are most desirable, but not at the expense of safety, communications, and operations. The location should provide at least one-half rotor diameter (consider the largest

helicopter expected to use the facility), but not less than 20 feet horizontal clearance between the takeoff and landing area and buildings, trees, fences, telephone poles, hillsides, or anything else that could be struck by main or tail rotors.

The landing area at the scene should be placed far enough away from activity centers where rotor downwash will not blow dust or supplies around and noise will not interfere with communications.

Minimum Size (Dimensions). As a general rule, takeoff and landing areas should be no smaller than twice the rotor diameter of the largest helicopter expected to use the facility. See figure 7.

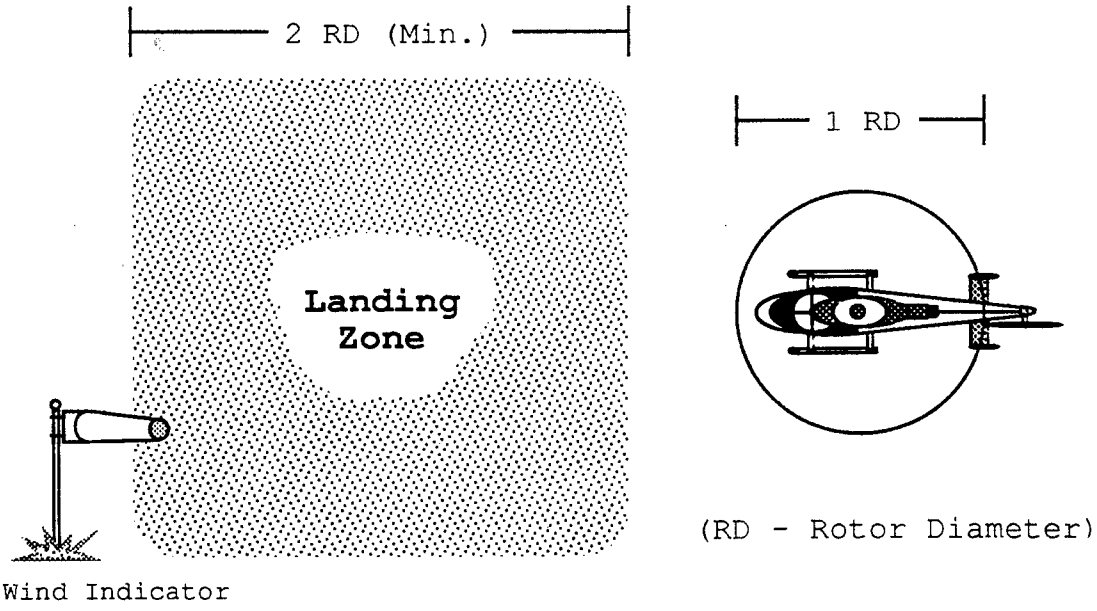

FIGURE 7 MINIMUM LANDING ZONE REQUIREMENTS

Surface Slope (in degrees). The landing surface should be flat (no bumps or depressions) and level or as near level as possible, but in no case should the slope exceed 10 degrees from the horizontal.

Surface Composition. Load bearing surfaces should be capable of supporting one and one-half times the largest helicopter's maximum takeoff weight. Heliport surfaces should be skid-resistant. To minimize the effects of rotor downwash all helicopter landing areas should be free of dust, loose dirt, pea-sized or smaller gravel, and other forms of loose debris and objects. Turf landing zones are quite suitable, but vegetation should be generally no higher than 12 to 18 inches in height. Wheeled helicopters are especially sensitive to soft landing

surfaces. A helpful practice in dirt areas is to wet down the landing area with a hose before landing operations begin.

Obstructions and Obstacles. Lights, tie-downs, signs, fire extinguishers, etc. within the takeoff and landing area, should be flush with the surface or mounted on frangible supports. Obstacles adjacent to permanent facilities should be marked and lighted and temporary landing zones should be situated as far away as possible from dangerous obstructions, particularly those that are difficult to see from the air, such as power lines, telephone lines, guy wires, and poles that blend into the background. Obstructions should be noted to pilots and lighted at night without interfering with the air crews night vision.

Approach and Departure Paths. Helicopters operate best when they are taking off or landing into the wind. Thus access and egress routes should point into the wind and provide an obstruction-free aerial pathway from the landing zone to an altitude of 500 feet above the surface at a horizontal-to-vertical ratio of 8:1 (in accordance with 14 CFR Part 77). See figure 8.

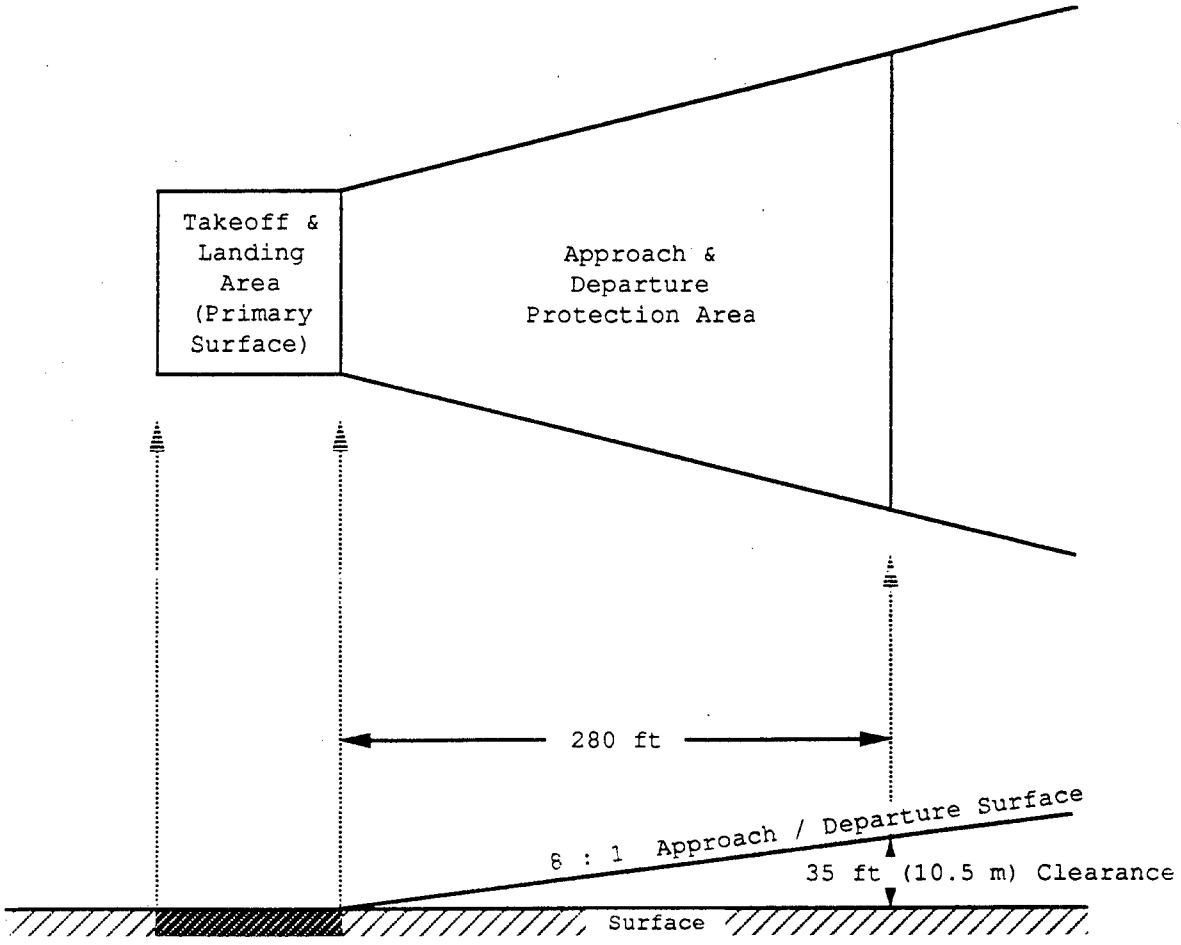

FIGURE 8 VISUAL APPROACH AND DEPARTURE PROTECTION AREA

In addition, approach and departure paths should not pass over command posts, treatment areas, or operationally congested areas on the ground where rotorwash and/or noise may interfere with communications and operations.

Wind Indicator. A means of indicating to the pilot the velocity and direction of the wind at the landing zone is essential. The preferred means is a wind sock or cone, but it can be as simple as a flag mounted on a pole. It should be located so as not to interfere with flight operations but still give a true indication of wind speed and direction. In areas with swirling or varying winds, such as near buildings or in mountainous areas, two or more wind indicators may be desirable.

Lighting. Lighting systems are necessary to support night operations, but they are usually only practical to install at permanent heliports. Portable lighting systems are commercially available and can be used at temporary facilities. Flares, vehicle lights, and other light sources are acceptable field expedients as long as they are deployed by trained personnel.

Security. For permanent sites, fences and hedges can effectively restrict inadvertent or unauthorized access to heliports and helipads, but they must not present a hazard to flight operations. It is absolutely essential to have specially trained and equipped personnel responsible for security at temporary landing zones, since confusion and excitement can create extremely dangerous situations for persons on the ground as well as for helicopters using the facility. For on-the-scene landing areas, an effective barrier of vehicles or very secure rope can aide in keeping the flow of relief activity away from the operational area.

Triage Areas (if appropriate). The primary concern in establishing a temporary landing zone to support disaster relief efforts should be aeronautical safety and efficiency of operations. On the other hand, in disaster situations, the highest priorities are always placed on saving lives and relieving suffering of the casualties. Therefore, emergency landing zones should be situated as close as possible to triage areas in order to facilitate and expedite patient transport. However, their location should not allow helicopter operations to interfere with the efforts of triage and medical teams or further endanger the victims and add to their discomfort with noise, rotor downwash, and flying debris.

Surveys and Inventory

Once site selection criteria are established, it then becomes possible to survey, inventory, and catalog all of the existing and potential landing sites. The first step is to locate and identify all existing local aviation facilities that are capable

of supporting helicopter operations. Specific attention should be paid to:

- o public-use heliports and airports;
- o private-use heliports and airports; and
- o hospital heliports.

With regard to these existing facilities, it is important to note not only their location, but the services, supplies, and other amenities they may have to offer. Of particular interest is the availability of fuel for helicopters. Another area of interest may be the medical or first-aid facilities located nearby and the direction, distance, and recommended routes to and from the nearest hospitals and trauma centers. Many air medical transport services have already surveyed their regions and developed "predesignated landing zones." Such listings, where available, may be very helpful. This last information should be provided to all police and fire units, as well as all ambulance services in the area.

It may be necessary to make special arrangements with the owners or operators of private-use heliports in the area to incorporate these facilities into the disaster response plan in order to have them available for use when needed. Since there are often many more private-use heliports than public-use heliports in any given locality, such preparation may yield a broader-based heliport system that may better meet the needs of the community in the event of a disaster and should prove quite useful during lesser emergencies.

Unfortunately, in many parts of the country, the number or distribution of helicopter landing facilities in the area may be inadequate to meet the requirements of the plan for helicopter response to disasters. If that is the case, a concerted effort to encourage and plan the development of public-use heliports may be called for to assure that they are established where they are needed. Not only would such a program enhance the community's ability to respond to disasters, but it would also provide business and transportation benefits to the public under normal, everyday conditions. In fact, under the auspices of the FAA's National Plan of Integrated Airport Systems (NPIAS), the FAA's Airport Improvement Program (AIP) can provide grants of up to 90 percent for planning and construction of public-use heliports and airports.

To augment the network of established helicopter facilities and to expand the coverage of potential helicopter response, it is advisable to pre-designate as many temporary landing zones as possible in parks, ball fields, school yards, vacant lots, etc. The same set of site selection criteria should be applied to the designation of these unimproved sites as suitable emergency landing fields and helicopter staging areas. For area hospitals

with small (or no) helipads on the premises, sites to handle overflow helicopter operations should also be identified and designated as auxiliary landing zones in nearby fields, parking lots, and roads that can be temporarily blocked off.

As the existing and potential landing zones in the jurisdiction are being identified, it is then necessary to collect and record the pertinent data and consolidate it in a directory or catalog that can be used by helicopter pilots. Photographs and/or drawings of the rooftops of all high-rise buildings in the area that are beyond the reach of ground-based fire fighting and rescue apparatus should be included. Local helicopter-pilot organizations or operators will usually be happy to assist in putting this information into a standardized form that would be recognizable and most useful to themselves and others. With this step complete, a directory of maps and charts, drawings and/or aerial photos of landing zone locations and layouts should be prepared and disseminated to all concerned. This document should be updated and disseminated as often as necessary to keep pace with new construction and other geographical changes.

Further collapse of buildings weakened by an earthquake or wind damaging storm could occur from helicopter or other aerial activities. Planners and helicopter operators should be aware of possibly causing further damage from helicopter noise vibration and rotor downwash. Airspace restrictions should not be so extensive as to interfere with valid and safe air operations, but need to limit operations that could cause further damage.

CHAPTER 6
PLAN ACTIVATION, EXERCISES, AND POST-INCIDENT ANALYSIS

Plan Activation

Once the plan has been developed, it is critical that it be tested several times before being implemented. Problems need to be identified and corrected with each exercise or actual event. All disaster response plans should be tested on a regular basis.

An activation checklist should be followed for either an exercise or the actual event. As shown in figure 9, the common elements to plan activation, are the following:

1. notification of requirement for helicopter support by a designated activation authority,
2. activation of the air operations branch,
3. activation of the log or record book,
4. determination of alert level by type of response required,
5. inclusion into the emergency operations network, and
6. notification of alert level to responders.

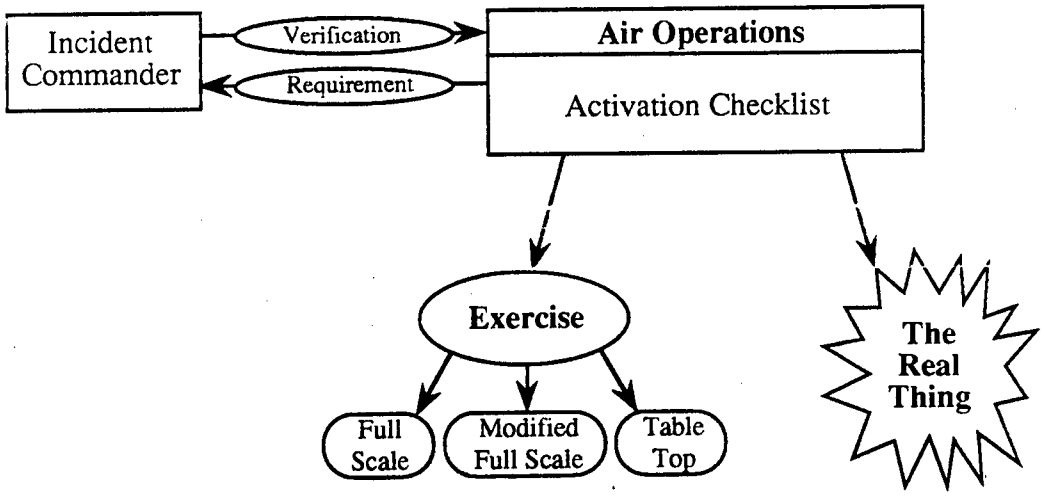

FIGURE 9 PLAN ACTIVATION

Exercises

Disaster preparedness officials have long known the value of conducting exercises. When a sophisticated piece of equipment such as a helicopter is involved, it needs to be included in the testing of the emergency response system. It has been said that experience is the best teacher and there is really no disputing that contention. Most of the principles of disaster planning are based on the sometimes painful lessons learned under actual catastrophic conditions. Like combat for soldiers, disaster situations test not only courage, stamina, and resourcefulness, but also the applied knowledge and acquired skills of the trained people who are responsible for disaster response. Obviously, waiting for disasters to happen in order to test their response effectiveness is just as unacceptable as waiting until wartime to evaluate military capability.

The military has long since recognized the value of exercises for training troops and determining the level of their effectiveness and readiness. Exercises provide the opportunity to learn how to best employ local helicopter assets in realistic and controlled settings that are relatively free of risk. Repetitive exercises first teach and then ingrain specific responses to specific situations by non-aviation people when working with helicopters. As a result, they become confident of their own skills and abilities, as well as those of the helicopter pilots and operators. The responders are therefore better able to perceive and effectively react to unforeseen complications. The observation and analysis of their response to simulated situations indicates what need there is for corrective actions to "shore up" weak areas. At the same time, these exercises instill confidence on the part of others in the community who learn that they can rely on helicopters for support in their time of need.

The first step in setting up a good training exercise is to develop a plausible and useful disaster scenario that tests the effectiveness of the local plan or a specific portion of it. The disaster situation should simulate realistic disaster occurrences such as hurricanes in South Florida or blizzards in North Dakota. Helicopter-based exercises, along with reaction exercises to disasters and mass casualty incidents, are invaluable in the experience they lend to the disaster workers. For example, when you practice for a blizzard, conduct your exercise during the winter after there is snow on the ground. Practicing for blizzards in July doesn't contribute to learning about winter operations and their unique characteristics.

Regardless of the scenario, it is important to publicize the schedule and objectives of the exercise well in advance so that helicopter operators can be prepared to accurately evaluate their performance. Unexpected or surprise exercises may have some value in testing response times, but generally they are to be

avoided if the overall objective is training or determining readiness. National Fire Protection Association (NFPA) Standard 424, FAR 14 CFR Part 139, and FAA AC 00-7B can serve as a guide for incorporating helicopter operations into airport and community disaster exercises. It is essential to continually maintain logs of all exercise events in order to fully document the strengths and weaknesses experienced. Once operational proficiency is demonstrated then the participants can be included in the plan.

Exercises involving the use of helicopters should be conducted as often as possible at one of three levels. There are advantages and disadvantages to each type of exercise and the final decision regarding which type to hold and how often to hold them should be left to the community planners.

Full-scale Exercises. Realism is the key to success in this type of exercise, but providing it can be expensive and time consuming. While there is always a certain amount of real risk associated with a full-scale response to a simulated situation, these exercises have the potential to provide the best possible training. This type of exercise is also an excellent way to expose weaknesses and deficiencies that cannot be anticipated in any other format.

Modified-Full-Scale Exercises. Very realistic exercises, which are nevertheless modified in order to save money and reduce risk to the participants, can effectively test the readiness and efficiency level of specific phases of the local disaster response. One variation of this type of exercise alerts all helicopter operators (according to the alert level of the scenario) and brings them to full readiness but does not actually execute the full response capability of the plan, or only does so partially. Once realistic response times are known, other modified exercises can be held to test the other parts of a given disaster scenario.

Table-Top Exercises. This type of exercise tests the communications network that is necessary for effective use of helicopters in disaster response. They are useful in the identification of deficiencies in response capabilities, but they only test the effectiveness of the model, not the "real thing." Table-top exercises have the distinct advantage, however, of being the least expensive and least time-consuming of all the exercise formats. They have a very high value when conducted correctly.

Post-Incident Analysis

One of the most important functions dealing with emergency preparedness is the post incident analysis. The ability to identify, analyze, and correct any problems or deficiencies is

critical to the successful integration of helicopters into the planning process.

It is recommended that debriefings of disaster workers occur as they come off shift or at the conclusion of the relief effort. The agencies that participated in the plan should be required to fill out an evaluation form or, at the very least, speak to a debriefer. Perhaps as a precursor to any stress debriefings which may occur, the disaster workers could be debriefed on their participation in the plan. The participants should be able to contribute to what happened during the incident and supplement the record and log book information. Briefly, planners should:

1. review documentation,

2. identify deficiencies, and

3. implement corrective action.

LIST OF ACRONYMS

AATC	Airborne Air Traffic Control
AC	Advisory Circular
AIP	Airport Improvement Program
AM	Amplitude Modulation
ANG	Army National Guard
ATC	Air Traffic Control
AT&T	American Telephone & Telegraph
CAP	Civil Air Patrol
CB	Citizens Band
CFR	Code of Federal Regulations
CP	Command Post
CPG	Civil Preparedness Guide
EMS	Emergency Medical Service
ENG	Electronic News Gathering
EOC	Emergency Operations Center
ETA	Estimated Time of Arrival
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FDC	Flight Data Center
FLIR	Forward Looking Infrared
FM	Frequency Modulation
HAZMAT	Hazardous Material
HELP	Helicopter Emergency Lifesaver Plan
IC	Incident Commander
ICS	Incident Command System
IFR	Instrument Flight Rule
LZ	Landing Zone
MCI	Mass Casualty Incident
NBVF	National Burn Victim Foundation
NFPA	National Fire Protection Association
NOTAM	Notice to Airmen
NPIAS	National Plan of Integrated Airport Systems
RD	Rotor Diameter
SAR	Search and Rescue
SARDA	State and Regional Disaster Airlift
UHF	Ultra High Frequency
USCG	United States Coast Guard
VHF	Very High Frequency
Xpond	Transponder

APPENDIX A
OUTLINE OF ELEMENTS FOR TYPICAL HELICOPTER INTEGRATION PLAN

The following is a title list for the major sections of a typical plan for integrating helicopters into emergency planning. Detailed elements of each section are then further delineated:

I. Establish Goals
II. Plan Preparation
III. Aircraft Resource Inventory
IV. Communications
V. Landing Areas
VI. Plan Activation, Exercises, and Post-Incident Analysis

Detailed section elements:

I. Establish Goals

A. Guideline Goals

1. Save lives
2. Effective orientation with helicopter capabilities
3. Effective integration of helicopters into local disaster preparedness
4. Open lines of communication between helicopter operators and the community
5. Encourage the establishment of heliports

B. Assumptions

1. General plan for emergency preparedness in effect or development
2. Incident command system usage
3. Helicopter assets available
4. Ground-based ambulances primary, expected means of transport.

C. Potential Helicopter Missions

1. Search and rescue
2. Transport of medical teams/supplies
3. Transport of disaster specialists
4. Transport of trauma patients
5. Emergency evacuation
6. Airborne control and assessment
7. Airborne air traffic control
8. Electronic news gathering
9. Fire fighting
10. Damage survey
11. External lift
12. Return of personnel and equipment
13. Security and crowd control
14. Inspection tours

15. Hazardous material operations
16. Inspection tours

II. Plan Preparation

1. Fully understand existing plans, agreements, regulations, and juristicional issues.
2. Train first responders in all elements of the plan.
3. Activate air operations branch of the incident command system.
4. Define alert levels
5. Identify manmade and natural hazards which could lead to a disaster
6. Develop special response procedures

III. Aircraft Resource Inventory

1. Identify and survey helicopter operators
2. Define operational requirements
3. Define capabilities of each participant
4. Verify and update survey information

IV. Communications

1. Establish an emergency communications network
   a. Command post
   b. Incident commander
   c. Air operations center
   d. Federal Aviation Administration air traffic control
   e. Mission assignment and briefing
   f. Medical information (patient status)
   g. Local airborne air traffic control
2. Establish procedures and protocols
   a. Federal airspace restrictions
   b. Medical information
   c. Air traffic control
   d. Mission assignment
   e. Documentation

V. Landing Areas

1. Selection criteria
   a. Logistical support
   b. Location
   c. Size and slope
   d. Surface composition
   e. Obstructions and obstacle identification
   f. Approach and departure paths
   g. Wind indicator
   h. Lighting
   i. Security

j. Proximity to treatment areas

2. Site survey and inventory
   a. Existing facilities
   b. Potential temporary sites
   c. Publish directory

VI. Plan Activation, Exercises, and Post-Incident Analysis

1. Activation checklist
2. Exercises
   a. Plausible scenario
   b. Full-scale exercises
   c. Modified-full-scale exercises
   d. Table-top exercises
3. Post-incident analysis
   a. Review logs
   b. Debrief personnel
   c. Identify deficiencies
   d. Implement corrective action

APPENDIX B
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